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The Chairman of the Armed Forces Medical Policy Council and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this JOURNAL.

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The Department of Defense recently asked the Subcommittee on Shock of the National Research Council to recommend to the Department of Defense a plasma substitute (antishock solution) that could be stockpiled immediately for emergency use. As a result of this request the Subcommittee recommended that the Knox P-20 type gelatin and dextran be stockpiled. Industry and the research agencies are continuing investigative work on other materials of a similar character.

Since receiving this recommendation the Armed Services Medical Procurement Agency has already begun negotiating with industry for the purchase of these two plasma substitutes, primarily dextran.

These plasma substitutes are not intended to supplant whole blood or blood derivatives, but are for the present to be stockpiled only for emergency use and until adequate amounts of plasma or other blood derivatives can be obtained to meet the requirements of the Department of Defense.

Richard L. Meiling

Richard L. Meiling, M.D.
Chairman

UNITED STATES ARMED FORCES
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Coronary Heart Disease in Mid-century With a Note Concerning Its Military Importance[1]

PAUL D. WHITE, *M. D.*

IT IS now 250 years since Theophile Bonet published the description of a fatal case of coronary occlusion, 182 years since Heberden's classical account of angina pectoris, 151 years since Parry published Jenner's letter relating angina pectoris to coronary artery disease, and 38 years since Herrick established the clinical picture of myocardial infarction. Yet only now, very belatedly, are we physicians beginning to undertake in anything like an adequate degree fundamental researches into the cause of the serious coronary artery atherosclerosis which is without doubt the most important of the threats to the health of man in civilized countries today. This disease has changed the course of history of families, communities, States, nations, and even of the world itself by crippling or killing some leader or group of leaders at the height of their careers in business, profession, or government. Of all kinds of heart disease it is the most important, not only because it is common the world over and serious but also because a concerted effort to discover its cause, or causes, has been so tardily established.

Pathologists for 100 years have described myocardial necrosis and scarring and for 25 years or more have presented to us pictures of the atherosclerotic lesions of the coronary arteries themselves but only very slowly have we physicians fitted these things into our practice of medicine in relation to diagnosis, prognosis, and treatment, and especially into the field of preventive medicine which, though most difficult, is also the most important of all. To practice preventive medicine intelligently we must understand the causes of disease and

[1] Presented at the Monthly Medical Meeting, 14 December 1950, Army Medical Center, Washington, D. C.

so etiologic researches are fundamental. Hence, although I shall first mention some advances in diagnosis, prognosis, and treatment of coronary heart disease in the last decade, I shall discuss mainly a search for clues of causes of serious coronary atherosclerosis.

Diagnosis.—In the past and still indeed today the most useful and often the only way to establish the diagnosis of coronary heart disease is by careful and experienced history taking. The all-important symptom of angina pectoris in its various manifestations and degrees and the more prolonged pain of acute myocardial infarction account for at least 75 percent of the cases. Electrocardiographic confirmation is common in such cases, but diagnosis by electrocardiogram (ECG) alone occurs in only a minority. Nevertheless, careful and experienced interpretation of ECG's and in particular the use of the unipolar precordial leads, will uncover a significant number of persons with otherwise silent coronary heart disease. Rarely is it necessary (or even wise) to resort to tests of exercise or low oxygen inhalation.

Prognosis.—We have learned in the last 2 decades that, despite the uncertainty of the prognosis in any individual case of coronary heart disease, most patients with angina pectoris or acute myocardial infarction survive for years and many regain a good state of health and activity with disappearance of angina pectoris through the development, sometimes slow, of an adequate compensatory collateral coronary circulation, or with sound healing of the infarct, the scar involving a minor part of the overabundant mass of left ventricular muscle. Any person with obvious coronary insufficiency can die suddenly soon after the beginning of the illness, as indeed may a person never sick before, but the great majority weather hundreds or even many thousands of individual episodes and may eventually with the application of common sense, the healing action of Mother Nature herself, and a certain amount of good luck be quite well again 10 or even 20 years later. Indeed I have followed so many thousands of cases personally that I think of at least a touch of coronary heart disease as being a more or less normal event in middle or older age in the case of a robust man.

Treatment.—Unhappily we have as yet no specific cure for coronary heart disease, despite the many remedies that are periodically announced and as quickly subside in popularity. Nor should we expect to find any sure-fire treatment. We are dealing with corroded and obstructed arteries which cannot be quickly or even slowly cleared, either chemically or physically. Surgical methods of bringing in new blood supply via anastomoses from an irritated pericardium or by transplants from voluntary thoracic muscles or omentum have not been

shown as yet to do better than, or even as well as, the natural development of a collateral circulation, although I do not in any way deprecate the value of continued efforts along this line. Nor can we as yet clear the obstructed coronaries by endarteriectomy as the French surgeons have ingeniously done in some cases of obstructed iliac and femoral arteries.

Of all drugs only the nitrites, in particular nitroglycerin and erythrol tetranitrate, have with the passage of time proved their widespread worth in alleviating symptoms and perhaps prophylactically saving lives. Other medicines, especially aminophylline, sedatives, khellin, and alcohol have had either limited value in relatively few cases or have had too many unfavorable side effects. Some drugs have been essentially inert, such as vitamin E, papaverine, and oxygen. In rare cases, however, well under 1 percent, the medical production of myxedema by irradiated iodine has been a godsend when for many months or years the daily occurrence of angina pectoris has rendered a patient an unhappy and miserable invalid. Indeed as symptomatic treatment this use of irradiated iodine has largely supplanted the sympathetic nerve resection or injection which we used to carry out in rare cases.

Dietary treatment is likewise unsatisfactory. The avoidance of hearty meals and the reduction of overweight by limiting caloric intake have their undoubted value but except for those reasons or a possible long-range prophylactic purpose the exclusion of certain foods, in particular cholesterol fats (butter, cream, and eggs) and the inclusion of other foods or drugs directed to affect cholesterol metabolism such as choline, inositol, and lecithin have not yet been adequately evaluated. Much of the cholesterol in the body is apparently of intrinsic origin, synthesized in liver or other tissue from carbohydrates, protein, and fat ingested.

And so we come to the most important aspect of coronary heart disease, namely, its cause and thereby prevention. Although we know very little as yet about the etiology of serious coronary artery atherosclerosis, I should like to summarize some of the aspects of the subject that we have been studying in Boston and which others elsewhere have been exploring. The challenge at last is being met and the more well-trained persons we can put on these researches and other studies of this vitally important disease the sooner we shall have some illuminating answers. I do not doubt but that in the next 20 or 30 years we and our successors will discover new facts which may help us to decrease the incidence of crippling coronary heart disease in our middle-aged citizens and to add life to years as well as years to life. I shall take up in order of apparent importance a number of factors that have already appeared to be of significance in a research

that we have been carrying on in Boston on young persons who developed evidence of coronary heart disease under the age of 40 years. We believed that in this youthful group we might discover the most important clues. In 1937 Dr. Glendy, Dr. Levine, and I analyzed briefly 100 cases of coronary heart disease in this age group. The second World War prevented a fuller study of the subject then but in 1947 Dr. Levine and I resumed our research with the help of Drs. Sprague, Bland, and Lerman and especially of Dr. Gertler and of our anthropologic colleague, Dr. Garn, and with the advice of Dr. Hamilton of Long Island Medical College, expert in the biology of sex. We collected a new series of 100 patients under the age of 40 years who had had acute myocardial infarction and 146 normal controls and carried out for over 2 years much more intensive studies than in the case of the earlier group. We were helped to do this by a grant from the Commonwealth Fund of New York City.

Sex.—Most striking of all has been the factor of sex. In our first series of 100 young patients 96 were men and only 4 were women; in our second series of 100 there were 97 men and but 3 women. Thus there was a total ratio of more than 24 to 1. Why this was so we do not yet know. What studies we have made of endocrinologic interest do not explain it but these have been far from complete. Interestingly enough, the urinary content of 17-ketosteroids has been reduced in our patients but this finding may be perhaps in part explained by the fact that most of them had undergone weeks of bed rest, though not within 6 months of the study, and had reduced their activity since. This vital clue of sex incidence remains unexplained and requires much study. Is it part of the seeming law of nature whereby the males of all species in the animal kingdom from earthworms and insects up through mammals live appreciably shorter lives than do the females? In the United States of America today a girl baby at birth has an average expectation of a bit over 70 years of life while a boy baby has something more than 4 years less. Is the male born with a thicker coronary artery wall to start with as has been suggested by certain observers, and if so, why?

Body build.—Of next importance seemingly in our study has been body build. Anthropologic technics have proved that most of the young patients, male or female, are of husky build, not just fat but rather muscular. Physical anthropologists divide the human race into three main groups according to body build: (1) endomorphs, or those with rotund shapes and considerable deposition of fat, (2) mesomorphs, those with stocky frames endowed with much muscle, and (3) ectomorphs, those with long slender frames and bones with relatively little fat or muscle. To be sure, there is usually a mixture of two of the three elements in most persons, and so they are graded

according to the relative amount of each present, numerically from 1 to 7 (that is, from little or none to a maximal amount). Thus a person graded as 2–6–1 would have some degree of endomorphy, a great deal of mesomorphy, and practically no ectomorphy. In our young coronary patients there was a great preponderance of mesomorphy, slight to moderate endomorphy, and little ectomorphy. There were no preponderantly ectomorphic patients in the entire series. Why is this? We don't know. Does it mean that muscular metabolism may play an important role, perhaps more important even than cholesterol metabolism? That also we don't know. It has not yet been studied. We have much to do and to learn. I might add that the occupations represented in our series were mostly the professions and white-collar jobs; there were but few hard-working laborers and farmers, but that may have been caused in part by the selection of patients that were sent to the study for the most part by consultants. A broader collection of patients should sometime be made to determine how representative our group is.

Blood cholesterol and other lipids.—A third but less clear clue from our study and that of others has been the finding of a distinct tendency for an elevated level of cholesterol in the blood (290 mg. per 100 cc. was the mean for our coronary patients as compared with 225 for our controls). There is a wide range, however, there being many exceptions. Some of our young patients with coronary heart disease had normal or even low blood cholesterol levels but a number of the healthy controls had high levels. It will be of interest in a follow-up study of the controls to determine whether or not those with higher cholesterol contents develop coronary heart disease sooner. We did find, however, that the ratio of total cholesterol to phospholipids was much more significantly altered in the coronary patients than was the total cholesterol content alone. This fact is in keeping with the finding of Dr. Barr and his colleagues at Cornell Medical School in a chemical study of the blood fractions in atherosclerotic patients of the higher than normal ratio of beta lipoprotein which contains a larger amount of cholesterol in relation to phospholipids, to alpha lipoprotein which contains much less cholesterol in relation to phospholipids. Two other researches of current interest should be mentioned here, the further details and significance of which need more exploration. One has been the finding by Dr. Gofman and his associates of the presence of appreciable amounts of a light molecule of cholesterol-protein floated at a so-called S_f[2] 10 to 20 level by the use of the ultracentrifuge in a much larger number of patients after acute myocardial infarction than of normal controls, e. g., 95 percent in men and 100 percent in

[2] Svedberg flotation.

women as compared to 60 and 45 percent respectively between the ages of 40 and 50 years. Whether the controls showing this type of cholesterol molecule are more likely than others to develop coronary occlusion remains to be determined.

Extensive studies are now being initiated in three other research centers in the United States to help amplify the California investigation and to include patients with diabetes mellitus and with hypertension. The other research referred to has been conducted by Dr. Sims of Columbia University. He has tested the amount of "lipfanogens" (precursors of visible fat) and of an inhibiting enzyme called "antilipfanogen" in the blood of normal and diseased persons by determining the amount of fat taken up from the blood by tissue cultures. He has found that the ratio of antilipfanogen to lipfanogen which is 1:1 in normal persons is much reduced in patients with nephrosis and diabetes and moderately reduced in those with coronary heart disease. A comparison of the findings in patients with coronary heart disease with those in controls using these three different technics (physical, chemical, and by tissue culture) has been planned. What will come from all this we have as yet no definite idea, but clearly research as to the blood and tissue content of the lipids and lipoproteins, their metabolism, and their relation to ingested food elements and to the deposition of cholesterol in and fibrosis and calcification of the coronary artery wall is of great importance. A corollary of all this is investigation of conditions of the artery wall itself which may predispose to the superimposition of these changes. Do factors of stress, trauma, and nutrition, through the vasa vasorum or otherwise, play a predisposing role? If so, how much and what?

Heredity.—In our series, and in others too, heredity has been found to be a significant factor, apparently at least in part through the inheritance of body build and metabolic influence. In 27 percent of our 100 young patients there was a history of coronary heart disease in either one of (24) or both (3) parents (23 fathers and 4 mothers) in contrast to 14 percent (16 fathers and 5 mothers) in the 146 controls.

Other findings.—Habits of work, exercise, nervous strain, diet, and the use of tobacco and alcohol seemed to have little etiologic significance although excess of some of these factors may precipitate or aggravate symptoms of disease already present. As a matter of fact, our coronary patients had ingested somewhat less cholesterol in their habitual diet than had the controls. The blood content of uric acid was, however, of some interest, being distinctly, although not greatly, higher in the coronary patients. The basal metabolic rate was on the low side, partly but not wholly to be explained by body build. The thyroid gland itself in the coronary group gave a lower reading

(17 to 41 percent) than the usual normal in its radioactive iodine uptake, or about midway between normal (39 to 50 percent) and myxedema (8 to 28 percent) levels. Finally, an interesting incidental finding concerned the reducing power of the saliva which was found to be greatly increased in the coronary patients as compared with the controls; the significance of this is not as yet understood.

Thus, the fatalistic attitude toward coronary heart disease in youth and middle age, and indeed in early old age, too, is being challenged. The few clues discovered to date are unexplained and some are not susceptible to control, but others which include cholesterol metabolism and perhaps diet, muscular metabolism, and exercise, and eventually possibly even the use of substances of prophylactic value may afford us means whereby we may delay the onset or slow the course of coronary heart disease in the civilized world of tomorrow.

ADDITIONAL NOTE ON THE CURRENT MILITARY IMPORTANCE OF CORONARY HEART DISEASE

It is evident from the experience of trained observers in military service that coronary heart disease has become increasingly more important in military personnel during the past decade. Before the first World War, and for some time afterward, coronary heart disease did not seem to be an important problem in military service, although quite likely it was occasionally overlooked. Electrocardiography was not then in any way a routine method of examination. During the second World War, however, the attention of the medical officers of the Armed Forces was directed to the occurrence of acute and chronic coronary heart disease in young and middle-aged men. Dr. Yater, for example, collected postmortem data on 450 men from 18 to 39 years of age in the military service of the United States who succumbed to coronary heart disease.

At present, with more careful exclusion of those candidates for the armed services who show any evidence of cardiovascular disease or of anxiety neurosis, there are fewer separations from the service for such conditions as congenital defects of the heart and blood vessels, rheumatic heart disease, hypertension, syphilitic aortitis, and neurocirculatory asthenia although patients with these conditions may infrequently still be found in the service or develop rheumatic fever, et cetera while on active duty. Even rheumatic fever, however, should be better prevented and controlled than in the past.

Evidence of coronary heart disease, however, may appear for the first time while the service man is on active duty. The strain of gruelling combat, physical overexertion, and intense cold, may precipitate evidence of coronary heart disease that has already been developing previously, although it may be symptomless. In 1949 the

hospital admissions per 1,000 mean strength per year in the U. S. Army and Air Force of persons with heart disease caused by coronary atherosclerosis were as shown in table 1.

TABLE 1.—*Admissions per 1,000 mean strength by age groups*[1]

Age (years)	*Rate*	*Age (years)*	*Rate*
Under 20	0	40 to 44	2.47
20 to 24	[2].02	45 to 49	2.20
25 to 29	[2].08	50 to 54	10.68
30 to 34	[2].08	Over 54	10.09
35 to 39	.34	Total admission rate	.25

[1] Statistics Division of the Office of the Surgeon General, Department of the Army.
[2] Rate based on less than 5 patients.

It behooves us, especially in view of the apparently progressive increase in the occurrence of coronary heart disease, to make more thorough and searching studies of the etiologic factors and possible prophylaxis in the young men of our country whether in military service or in civil life.

The Neuropsychiatric Implications of Illiteracy[1]

WILLIAM A. HUNT, *Commander, MSC, U. S. N. R.*[2]
CECIL L. WITTSON, *Commander, MC, U. S. N. R.*[3]

ILLITERACY, defined as the inability to read and write, constitutes a serious problem for the military services in any period of national mobilization. Under peacetime conditions the services ordinarily avoid this problem by the imposition of educational requirements at the recruiting station level. With a national emergency and total mobilization, however, manpower requirements have always dictated that the services accept recruits who show such educational disability. In modern technical warfare the inability to read and write becomes a serious handicap which must be overcome if the recruit is to operate efficiently within the military service. Since illiteracy is most commonly an educational defect attributable to educational and cultural handicaps, the obvious solution is to introduce an educational program designed to teach the recruit to read and write. This solution was adopted by both the Army and the Navy during the last war. Literacy training programs were instituted for all men who, though unable to read and write, were adjudged capable of learning. Unfortunately the solution is not as simple as it sounds. Although mainly attributable to educational and cultural handicaps, illiteracy has many and important neuropsychiatric implications. These stem from two sources: (1) illiteracy is often symptomatic of some underlying personality difficulty and (2) illiteracy operating as a handicap to adjustment may be a contributing factor in the development of personality disorders. This makes it necessary, in any program involving the training of illiterates, to pay particular attention to the personality structures of the persons involved and to the possibility of concomitant neuropsychiatric problems.

[1] This study is part of a larger research project subsidized by the Office of Naval Research and being conducted by the authors at Northwestern University.
[2] Northwestern University, Evanston, Ill.
[3] Medical College of the University of Nebraska, Lincoln, Neb.

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From the symptomatic approach, illiteracy may be an indication of mental deficiency. The performance of the symbolic functions involved in reading and writing requires some minimal intelligence and if a person does not possess this, no amount of training or opportunity will make him literate. Various organic conditions may be responsible for inability to read and write. Illiteracy also may be indicative of psychopathic personality. Occasionally an asocial psychopath resists the educational discipline of school as a part of his general rebellion against society. We have also found a few inadequate personalities among the illiterate group. Emotional instability, as well, can contribute to illiteracy as can the general withdrawal or schizoid pattern of behavior which may lead a child to an educational backwardness often confused with mental deficiency.

On the etiologic side, the inability to read and write imposes a serious handicap on the person's ability to adapt to the demands of contemporary social living. Illiteracy becomes a source of insecurity, anxiety, and increasing social isolation. Particularly in the military services, it may lead to disciplinary difficulties resulting from ignorance of posted orders. It also leads to unfortunate compensatory trends as a person tries to overcome the emotional problems involved. All these considerations stress the necessity of a neuropsychiatric supplementation to the simple educational approach if we are to have an adequate handling of the illiteracy problem.

In this article the relative incidence of neuropsychiatric disability in a typical group of illiterates is discussed. Are personality difficulties really more numerous in such a group than they are among literates? Is there a higher neuropsychiatric attrition rate during military service? The answer bears directly on the military efficiency of the illiterate recruit and on such complex actuarial questions as whether or not it is worth while for the military services to induct illiterate recruits and spend time, money, and effort on their training. Since the recruits inducted in wartime furnish a fairly representative sample of the population, we believe that our findings have implications beyond the narrow military situation for the further understanding of the general problem of literacy. Two groups of illiterates were studied, one of 940 and one of 473. Both groups were selected at random from muster lists of illiterate recruits arriving at a naval installation for literacy training. The health record of each man was then obtained and abstracted. From this we ascertained the number of recruits discharged for neuropsychiatric reasons during their literacy training, and the subsequent neuropsychiatric attrition rate of the remainder for about 1 year of service.

It must be remembered that, from the neuropsychiatric point of view, these were selected groups. As was customary at this time,

these men were forwarded from recruit training centers where their illiteracy originally had been detected and where they had previously received a neuropsychiatric screening examination in order that they might be judged able to benefit from literacy training. This preliminary screening must have removed many neuropsychiatric cases.

Despite this preliminary screening, of the first sampling of 940 such recruits, 102, or 11 percent, were separated from the service for neuropsychiatric reasons during their literacy training. This is in contrast to an average screening rate at this period for all incoming recruits at naval training centers of from 3 to 4 percent. If we remember that many of the illiterates must have been screened out before being sent for literacy training, it would seem conservative to estimate the incidence of established neuropsychiatric conditions in the original group as at least 15 percent or about 4 times that for the recruits as a whole.

Of those separated, 97 were given inaptitude discharges for the reasons shown in table 1. Of the 5 who were given medical surveys, 2 were for constitutional psychopathic state, inadequate personality, 1 was for personality disorder, 1 was for enuresis, and 1 was for dementia praecox. Over one quarter of the men separated during training were discharged as morons although they had previously been screened at recruit training centers and adjudged to be capable of learning to read and write. Another quarter were called "unable to learn," a diagnosis used to avoid the stigma of mental deficiency and frequently employed where mental deficiency was suspected but where a clear diagnosis could not be made. These results point up the difficulty of a differential diagnosis of mental deficiency as opposed to simple illiteracy. Some of this may be attributable to the professional inexperience of those psychiatrists unacquainted with the problem who may assume that the two conditions are necessary corollaries of each other. This same difficulty in diagnosis is brought out in some of our other studies in psychiatric attrition during military service. We not infrequently find a recruit discharged from the Navy with a diagnosis of mental deficiency, although our records show that he received adequate and valid psychologic testing during the training period and was adjudged to be of low normal intelligence at that time, although suffering from a literacy handicap. In such cases the erroneous diagnosis is based on the assumption that illiteracy *always* is indicative of mental deficiency. The remaining 47 percent illustrate our point that illiteracy may also be a corollary of personality disorder although they furnish no evidence as to whether or not the educational difficulties were precipitated by the personality maladjustment or whether they were influential in precipitating the personality disorder. It is highly probable that both interpretations

are correct and that in most of these cases we are getting a mutually reinforcing reaction between the personality difficulty and the educational handicap.

TABLE 1.—*Reasons for inaptitude discharges of illiterate recruits*

Reason	*Number*	*Reason*	*Number*
Mental deficiency, moron	26	Somnambulism	2
Inability to learn	25	Convulsions	1
Inadequate personality	16	Schizoid personality	1
Functional somatic complaints	10	Diagnosis questionable	5
Enuresis	9		
Emotional instability	2	Total	97

In about 1 year of active service following the literacy training period, 28 men or 3 percent of the group were discharged for neuropsychiatric reasons. The rate for the Navy as a whole in this period was 1.6 percent. Thus even after literacy training and multiple and careful neuropsychiatric screening, these illiterate recruits are a poorer neuropsychiatric risk than are their literate companions. The diagnoses of these 28 men are shown in table 2. About one-third of these were classed as mentally deficient although they had escaped this diagnosis during training. The remaining 20 illustrate the relation between illiteracy and the various personality disorders. Because these disorders were not detected during training, they may well represent persons in whom an illiteracy handicap contributed to the development of personality maladjustments.

TABLE 2.—*Diagnosis of illiterates discharged for neuropsychiatric reasons*

Diagnosis	*Number*	*Diagnosis*	*Number*
Personality disorder	9	Enuresis	1
Mental deficiency, moron	8	Constitutional psychopathic state, emotional instability	1
Psychoneurosis, anxiety	2	Temperamental unsuitability	1
Schizophrenia	2		
Epilepsy	2	Total	28
Speech disorder	1		
Somnambulism	1		

We also investigated the disciplinary discharges among this group. Lumping together as "bad" all discharges labeled "bad conduct," "undesirable," or "dishonorable" we found that the disciplinary discharge rate was 1 percent for the year of the study. This is at the high end of the distribution for other recruit samples studied by us but is not sufficiently larger to be significant.[4 5] To make certain that

[4] HUNT, W. A.; WITTSON, C. L.; and BURTON, H. W.: Validation study of naval neuropsychiatric screening. J. Consult. Psychol. 14: 35–39, Feb. 1950.

[5] HUNT, W. A.; WITTSON, C. L.; and BURTON, H. W.: A further validation of naval neuropsychiatric screening. J. Consult. Psychol. In press.

the original sample of 940 illiterates studied by us was representative and that the figures derived from it were valid, we selected another group of 473 illiterates for the same treatment. The discharge rates in this second group were similar to those in the first and indicate that our samples were stable and adequate. In this second group, 14 percent were separated for neuropsychiatric reasons during literacy training, 3.4 percent subsequently received neuropsychiatric discharges in the following year of service, and 0.7 percent received disciplinary discharges in that year.

Our findings indicated that, as a group, the illiterates are a greater neuropsychiatric risk in the military services than are literates. It would appear that of every group of 100 illiterates inducted for military service about 15 will be given neuropsychiatric discharges before their literacy-training program is completed and 3 more will be neuropsychiatric casualties by the end of the first year of service. It is impossible to unravel the actual cost of this high neuropsychiatric rate to the Government.[5] The cost is high but whether or not it is compensated for by the service rendered by the 82 still surviving after 1 year is an open question. It would appear, however, that as a group illiterates are not preferred material for military service and should be inducted only when a manpower shortage exists.

SUMMARY

Our study indicates that there is a much higher incidence of neuropsychiatric disorders among the illiterates than among comparable literate groups. Illiteracy is often diagnostic not only of mental deficiency, but of the various personality disorders as well. Moreover, illiteracy would seem to add to the stress of personal adjustment and as an added handicap would appear to predispose the illiterate to personality difficulties. In handling the problem of illiteracy through any special training program, therefore, it would seem advisable to provide intensive psychiatric service, both diagnostically and therapeutically, since the handicap offers more than a simple educational problem.

Recent Advances in Military Ophthalmology[1]

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THIS article will attempt to cover some of the more important recent advances in those phases of ophthalmology which have a direct bearing on the efficiency of the military services.

EFFECTS OF SERVICE ENVIRONMENT ON THE EYES

The solar spectrum and the use of ophthalmic filters.—Each of the services has sunglass requirements. It has been recommended that the Armed Forces standardize a neutral gray lens of 15 percent transmission for normal sunglass use with special lenses to be obtained for special purposes. Transmission of 15 percent was selected after it was shown that this level gives satisfactory visual acuity and at the same time affords adequate brightness protection under most sunlight conditions. It also preserves subsequent night vision adequately except under conditions of extreme brightness such as snow and beach exposures. When the protection of subsequent night vision is important under such conditions, special lenses will be required. For travel on snow into the sun, for example, lenses with transmissions as low as 3 or 4 percent may be required.[3]

The neutral density gray lens which transmits a nearly uniform percent of visible light rays of various wavelengths was selected because it was shown that colored lenses do impair color perception to some extent [4-6] in spite of the fact that color adaptation occurs.[7] The

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[1] Presented at the Meeting of the Pan-American Congress of Ophthalmology and the National Society for the Prevention of Blindness, Miami, Fla., 29 Mar. 1950.

[2] U. S. A. F. School of Aviation Medicine, Randolph Field, Tex.

[3] EISBERG, H. B.: Investigation of protection afforded by standard issue Army and Navy sunglasses and goggles from solar radiations present in Arctic. Task Force Sixty-Eight, Operation "Nanook." Research Report X–735 (Av–382–e), 6 Jan. 1947.

[4] FARNSWORTH, D.: Effect of colored lenses upon color discrimination. U. S. Naval Submarine Base, New London, Conn. Color Vision Report 9, 3 Sept. 1945.

[5] ROSE, H. W., and SCHMIDT, I.: Physiological effects of reflective, colored, and polarizing ophthalmic filters. USAF School of Aviation Medicine, Randolph Field, Tex. Project 21–02–040, Reports 1 and 2 (in press).

[6] SCHELLING, H.: Method for calculating effect of filters on color vision. Medical Research Laboratory, U. S. Naval Submarine Base, New London, Conn. Report 148, 15 Sept. 1949.

[7] PECKHAM, R. H.: Influence of sunglasses on object color perception. Office of Naval Research, Philadelphia, Pa. U. S. Navy Project NR 142–565, 16 Sept. 1949.

ultraviolet rays are excluded by the glass of the lenses and the infrared transmission is low enough to be acceptable. The inconel coating used for top-grading of lenses has been found to be susceptible to abrasion, but is otherwise acceptable for special purposes.[8,9] Top-graded lenses can be used for sun scanning for short periods of time.

The usefulness of ophthalmic filters in penetrating haze has been repeatedly studied but no filter has been found that will increase the accuracy of riflemen and most filters decrease it.

Use of the eyes in dim light.—Instrument lighting is a problem aboard ships and submarines, in tanks, and aboard aircraft. When protection of night vision is necessary it has long been known that red light is best because it has no influence on the retinal rods. It has been shown that ability to read instruments is not significantly affected by the wavelength of the light used, so red light is not contraindicated from that standpoint.[10] In the completely dark-adapted eye the critical intensity of illumination is about 0.22 foot-lambert.[11] With the recent development of a satisfactory red illumination system for Air Force and Navy aircraft, red lighting will now be used by the Armed Forces for illumination of instruments when preservation of night vision is important.[12-14]

The use of binoculars at night has been extensively studied.[15] In general they are not satisfactory for scanning, but are useful in examining specific areas because of the magnification they produce. Four- to six-power binoculars are about as high a magnification as should be used. The focus of binoculars at night is usually 0.5 to 0.75 diopter more minus than in daylight vision.[16] The pupil is dilated and this accentuates the aberrations of the optical system.

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[8] SCOBEE, R. A.: Tests of graded density sunglasses, Types A and B. USAF School of Aviation Medicine, Randolph Field, Tex. Project 358, 27 Jan. 1945.

[9] STUMP, R., and PINSON, E. A.: Durability of metallic coating on graded density sunglasses. Air Matériel Command, Wright-Patterson Air Force Base, Dayton, Ohio. Serial TSEAL3C-695-47, 12 Jan. 1945.

[10] SPRAGG, S. D. S., and ROCH, M. L.: Dial reading performance as related to illumination variables. Air Matériel Command, Wright-Patterson Air Force Base, Dayton, Ohio. Report MCREXD-694-21A, 1 Dec. 1948.

[11] SPRAGG, S. D. S., and ROCH, M. L.: Dial reading performance as related to illumination variables. Air Matériel Command, Wright-Patterson Air Force Base, Dayton, Ohio. Report MCREXD-694-21, 1 Oct. 1948.

[12] BROWN, F. R., and POPPEN, J. R.: Visual problems in designing improved indirect lighting for aircraft cockpits. J. Aviation Med. (in press).

[13] ROBERTS, L. B.: Interior lighting of M-4 tanks. Armored Medical Research Laboratory, Ft. Knox, Ky. Project 7-2 and 7-3, 25 Feb. 1943.

[14] ROBERTS, L. B., and MANN, W. E.: Establishment of criteria and methods for selection of crews for night operations. Armored Medical Research Laboratory, Ft. Knox, Ky. Project 7-5 and 7-8, May 1944.

[15] BRACKETT, F. S.; ROBERTS, L. B.; and MANN, W. E.: Advantages of using binoculars for night seeing. Armored Medical Research Laboratory, Ft. Knox, Ky. Project 6-1, 24 Mar. 1945.

[16] WALD, G., and GRIFFIN, D. R.: Change in refractive power of human eye in dim and bright light. J. Optic. Soc. America 37: 321-336, May 1947.

Probably about 0.25 diopter of the "night myopia" is caused by spherical aberration, 0.5 diopter by chromatic aberration, and any balance by involuntary accommodation. This "night myopia" does not apply above cone levels of illumination. For this reason the suggestion sometimes made that spectacles for night driving be made 0.5 diopter more minus that the regular distance correction is not justified. The "night myopia" only occurs in average persons while rod vision is being used when the light is below the brightness of moonlight.

Although nonreflecting surface coating of lenses in optical instruments has been shown to be valuable, the surface coating of transparent aircraft panels has not.[17] Such surface coating does not increase light transmission enough to cause appreciable change in brightness. The ability of such coating to decrease specular reflection is useful, but shielding the instrument lighting will produce the same effect. The coating itself, if used, may produce a slight haze but this is insufficient to be of serious import in night vision.

Vibration effects.—All types of motor-propelled craft produce vibrations that may be transmitted to the instrument panel of the tank, ship, or plane. Some of these craft in addition produce vibrations that may be transmitted to the eye. The eye has a tendency to vibrate at its own frequency, which is about 40 cycles per second. This may be induced at high frequencies but is more likely to be produced by low frequencies, especially 10 to 40 or 60 to 90 cycles per second.[18] No specific damaging effects of ultrasonic vibration on the eyes are produced by current aircraft of any type nor are they expected in aircraft of the near future. Lethal effects produced in fur-bearing animals by such vibrations are thermal in nature and are caused by conversion of acoustic energy to heat by the fur. This does not occur in man because of lack of fur, higher heat tolerance, and a more efficient heat dissipation mechanism. The vibration of the instrument panels is very fatiguing to the observer. Vision is maximally altered by vibrations of from 25 to 90 and altered little by vibrations over 100 cycles per second. Low intensity illumination or the use of small print increases the difficulty of reading under conditions of vibration.[19] The minimal threshold for perception of vibration has been shown to

[17] CHAPANIS, A., and SCHACHTER, S.: Visual effectiveness of low reflectance coatings applied to transparent areas of aircraft. Air Matériel Command, Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. TSEAL3–695–62, 31 Oct. 1945.

[18] DUGUET, J., and MERCIER, A.: Physiopathologie Oculaire de l'Aviateur. Publication Societe d'Ophthalmologie de Paris, Nov. 1947.

[19] CROOK, M. N.; HARKER, G. S.; and HOFFMAN, A. C.: Studies of effect of typographical spacing on legibility of numerals under vibration. Air Matériel Command, Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. MCREXD–694–1 Q, 23 Dec. 1948.

be about 0.0056-inch double amplitude at a viewing distance of 14 inches.[20]

High altitudes.—Flight at high altitudes produces effects caused by decreased oxygen tension, decreased barometric pressure, increased brightness of sunlight, and decreased sky brightness. The hypoxia causes (1) cyanosis of the retinal vessels, (2) increased diameter of the retinal vessels with consequent increased volume, (3) intra-arterial tension proportional to the rise in the general circulation, (4) increased intraocular tension which parallels the vascular changes, (5) pupillary constriction caused by increased metabolites and inhibition of the constrictor, (6) decreased accommodation, and (7) decreased night vision.[18] All these effects can be reversed by the administration of oxygen alone without changes in the barometric pressure. These changes are important when air evacuation of patients with eye injuries or eye diseases is considered. The recent development of laboratory technics for determining the effect of hypoxia on the retina and visual pathways has shown that the cortex is affected first by oxygen lack and that the retina can be stimulated about twice as long as the cortex with complete oxygen deprivation.[21] Technics developed in this study are now being used to evaluate the beneficial or toxic effects of drugs on the visual pathways.[22]

The decreased barometric pressure may produce bubbles (dysbarism, "bends") that may pass into the cerebral circulation. These bubbles may produce a vascular spasm with scintillating scotomas and visual field changes. The electroencephalogram is altered showing a decreased frequency of the alpha waves. It returns to normal as the scotomas disappear and the headache caused by vasodilatation appears. There may be accompanying profound generalized symptoms. Retinal vasoconstriction and visual field changes are important diagnostic criteria for cerebral vasospasm produced by "bends." These latter visual changes are frequently a recompression phenomenon coming on as the subject approaches the ground. This is presumably caused by reduction in the size of the intravascular bubbles, permitting them to reach the cerebral circulation. Pressurized cabin aircraft permit flights at high altitudes with almost none of these conditions occurring.

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[20] CROOK, M. N.; HARKER, G. S.; and HOFFMAN, A. C.: Determination of amplitude thresholds for visual perception of vibration. Air Matériel Command, Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Memo Report MCREXD–694–1 R, 21 Feb. 1949.

[21] NOELL, W., and CHINN, H.: Effects of anoxia on retina and optic pathways. USAF School of Aviation Medicine, Randolph Field, Tex. Project 21–02–111. (In press.)

[22] NOELL, W., and CHINN, H.: Method for evaluating toxic or beneficial effects of various drugs on visual pathways. USAF School of Aviation Medicine, Randolph Field, Tex. Personal communication, Jan. 1950.

Incident illumination from the sun exceeds 12,000 foot-candles at 40,000 feet.[23 24] The newly standardized sunglasses previously mentioned will give adequate protection both as to brightness and abiotic rays at our highest present operational altitudes. The sky brightness at high altitudes is reduced to about 35 percent of that at ground level because of lowered concentration of light-reflecting particles of dust and moisture. Problems of visibility are, therefore, changed. Other aircraft are most apt to be seen as bright spots on a dark background, rather than the reverse as seen at ground level. This decreased sky brightness also produces visibility problems inside aircraft because of the small amount of light reflected into the cockpit from the darker sky. This may vary from 0.12 to 6,000 foot-candles at one aircraft position, depending on the direction of its flight in relation to the position of the sun.

Acceleration forces.—Angular accelerations occur in aerial movements such as a pull-out from a dive or in a turn. In a pull-out from a dive the flyer is forced down into his seat and may experience a force on the seat equivalent to many times his real weight. If this force is equivalent to four times his body weight, it is referred to as 4 g or four times the pull of gravity. In straight and level flight there is a force of 1 g on the seat. Higher g forces produce their stresses throughout all the body tissues. At 6 g, for example, the blood has the weight of molten iron. Pull-out from a dive produces positive g (head-to-seat force). In an outside loop negative g (seat-to-head force) is produced. Physiologic effects are complex and are not primarily ophthalmologic in nature, but the symptoms that temporarily incapacitate the flyer are ophthalmologic.

In head-to-seat forces the blood is forced away from the head. When the systolic pressure falls below 20 mm. of mercury, the retina becomes ischemic because the intraocular pressure now exceeds the vascular pressure. This ischemia produces a reduction first in the nasal field which then spreads entirely across the visual field until central vision is lost. The onset of this "graying out" can be noted by the average observer at 3 to 4 g.[25] He "blacks out" on the average at 4 to 5 g. Anything which can be done to raise the vascular pressure in his eyes will increase his g tolerance. This can be done by suits exerting pressure on his legs and abdomen to reduce pooling of blood. It can also be done by shortening the heart-to-eye level by

[23] CHRISTENSEN, J. M.: Some typical sky and earth brightnesses at altitudes 10,000 to 40,000 feet and relationship to eye-adaptation problems of radar operator. Air Matériel Command, Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. TSEAL–694–11, 9 Dec. 1946.

[24] MATTHEWS, J. L.: Some considerations in selection of flying sunglasses. J. Aviation Med. 20: 39–46, Feb. 1949.

[25] Synopsis of aero medical aspects of jet-propelled aircraft. Air Matériel Command, Wright-Patterson Air Force Base, Dayton, Ohio. Unnumbered report, 24 Mar. 1949.

crouching or by assuming the prone position. The prone position shortens the heart-to-eye distance by about one-half and increases tolerance to about 12 g.[25]

Even prior to blackout, errors made by flyers in reading instruments are increased. This is appreciable at 3 g and above. Reaction time to sound is actually shorter than to light under such conditions.[26] Sound can also be distinguished after the flyer has blacked out entirely. For these reasons some warning devices which are now visual may be changed to auditory.

Negative acceleration is present when the force is from seat-to-head. This would occur if a flyer were suddenly ejected in the upright position through the bottom of an airplane by an ejection seat. Ocular tolerance to negative g has been shown to be much less than for the positive (head-to-seat) type.[27] A flyer can withstand about 3 g if the duration is over 1 second, about 7 g if under 1 second and much more if the duration is extremely short.[28] Negative g lasting over 3 seconds produces a feeling of fullness in the head and orbits, may produce conjunctival hemorrhages and usually produces a dimming of vision called "redout." This is caused by the lower lid covering the cornea, although it was previously thought to be caused by vascular changes in the retina.

Visual illusions.—Many illusions occur in flight. Of these the most interesting are those occurring at night. The autokinetic phenomenon occurs when only a single light is visible in the dark. Even though both the light and the observer are stationary, the light appears to move.[29] Gravitational forces produce a different type of phenomenon in which the g forces produce apparent motion of lights. This motion is caused by the stimulation of the semicircular canals and is a function of the nystagmus which is produced.[30–33] If, in addition

[25] CANFIELD, A. A.; CONREY, A. L.; and WILSON, R. C.: Study of reaction time to light and sound as related to increased positive radial acceleration. J. Aviation Med. 20: 350–355, Oct. 1949.

[27] GAMBLE, J. L.; SHAW, R. S.; GAUER, O.; and HENRY, J. P.: Physiological changes during negative acceleration. Air Matériel Command, Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Memo Report MCREXD–695–74 L, 25 July 1948.

[28] SHAW, R. S.: Human tolerance to negative acceleration of short duration. J. Aviation Med. 19: 39–44, Feb. 1948.

[29] GRAYBIEL, A., and CLARK, B.: Autokinetic illusion and its significance in night flying. U. S. Naval School of Aviation Medicine and Research, Pensacola, Fla. Project No. X–148 (Av–V4–3), 7 Feb. 1945.

[30] BROWN, R. H.; IMUS, H.; NIVEN, J. D.; and GRAYBIEL, A.: Relationship between apparent displacement and motion in the oculogyric illusion. U. S. Naval School of Aviation Medicine and Research and Tulane University Joint Project. Tulane N. R. 140–455, Navy Project NM–001–037, 1 May 1949, Reports 1, 2, and 3.

[31] GRAYBIEL, A., and HUPP, D.: Oculo-gyral illusion—form of apparent motion which may be observed following stimulation of semi-circular canals. U. S. Naval School of Aviation Medicine and Research, Pensacola, Fla. Project X148 (Av–V4–3), 1 Nov. 1945.

[32] GRAYBIEL, A.; CLARK, B.; MACCORQUODALE, K.; and HUPP, D. I.: Role of vestibular nystagmus in visual perception of moving target in dark. U. S. Naval School of Aviation Medicine and Research, Pensacola, Fla. Project X–148 (Av–V4–3), 14 Jan. 1946.

[33] VINACKE, W. E.: Aviator's vertigo. J. Aviation Med. 19: 158–170, June 1948.

to the fixation light, large visual stimuli are present, neither of these phenomena occur. They are important in flying because they can cause flyers to become badly disoriented and to crash before they have time to recover.

Markings on aircraft and runways to increase visibility.—The necessity for locating aircraft in flight and on the ground following emergency landings has led to continued search for the most suitable markings. If standard aluminum aircraft are used, they can be located best in flight if the trailing halves of their wing and empennage surfaces are painted glossy sea blue.[34] If operating in arctic regions they can be located best on the ground if insignia orange paint is used on the aluminum aircraft.[35] It should be applied in a solid color over the entire posterior portion of the airplane from the center of the wing to the end of the rudder. By this use of color with the aluminum airplane, both chromatic and achromatic contrasts are provided. Runway markings to give the best visual orientation for the pilot coming out of a low overcast have been found to be chevrons of either black on yellow or yellow on black. The chevrons give information as to the portion of the runway which is visible and the direction in which the runway extends.[36] Such markings give the necessary final visual aid to aircraft landing under low ceilings.

VISUAL STANDARDS AND EYE EXAMINATIONS

Each service is attempting to analyze the visual requirement for each of its jobs.[37] They are trying to set up standards to procure personnel with the visual skills required for these jobs. Finally, they are attempting to standardize examining technics that can be administered as accurately and as rapidly as possible by nonophthalmologists.

Color vision.—Color saturation thresholds can now be accurately measured and should give better information regarding the effects of various environmental factors on color perception.[38] Pseudo-

[34] WAGNER, H. G., and BLASDEL, I. C.: Visibility studies of exterior schemes for aircraft at present aluminum color. Aero Medical Equipment Laboratory, Naval Air Matériel Center, Philadelphia, Pa. TEDNAM–AE–525044, 18 May 1948.

[35] WILCOX, L. R., and GRETHER, W. F.: Color markings for aircraft operating in Arctic regions. Air Matériel Command, Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Report AF–TR–5814, May 1949.

[36] GERATHEWOHL, S., and HASER, H.: Study of runway markings and identification lighting system. USAF School of Aviation Medicine, Randolph Field, Tex. Project 21–02–007, Apr. 1949.

[37] BRACKETT, F. S.: Vision in tanks; determination of visual requirements for various tasks in armored vehicles. Armored Medical Research Laboratory, Ft. Knox, Ky. Projects 6–1, 6–2, and 6–4, 23 Jan. 1943.

[38] SCHMIDT, I., and BINGEL, A.: Effects of oxygen deficiency and various other factors on color saturation thresholds. USAF School of Aviation Medicine, Randolph Field, Tex. Project 21–02–041 (to be published).

isochromatic plates are still the best single screening test for color deficiency.[39 40] Anyone who can honestly pass a properly administered pseudo-isochromatic plate test can perform any color discrimination task required by the Armed Forces. Illumination has been shown to be such a critical item in giving these tests that artificial light of proper daylight color temperature should be used in preference to natural daylight.[41 42] Not only light of low color temperature, but also light of high color temperature (similar to a north sky) may produce unreliable results.[43]

All the Armed Forces are interested in the use of the 9 percent of men with defective color vision. The best way to determine whether a mildly color-defective man can do any particular color-vision task is to use a test which simulates it.[44] If certain lights are to be identified, lights of the same intensity, color, and subtended visual angle must be used in the test.[45 46] The loss of brightness experienced by color-defective men has not been adequately appreciated until recently. Deuteranopes lose about 40 percent of the brightness of their fields and protanopes lose about 50 percent. This point may be important in selecting personnel for specific low-illumination jobs.

Visual acuity.—The importance of visual acuity has been amply demonstrated in connection with many service tasks. One of the interesting studies in this respect was the demonstration of its relationship to success in combat flying. It was the visual factor which seemed to have the highest correlation with success in aerial combat.[47] Most of the service visual tasks have been assessed and the specific requirements established for visual acuity in those positions.

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[39] FARNSWORTH, D.; SPERLING, H. G.; and KIMBLE, P. F.: Battery of pass fail tests for detecting degree of color deficiency. Medical Research Laboratory, U. S. Naval Submarine Base, New London, Conn. Report 147, 10 Aug. 1949.

[40] SCHMIDT, I.: New tests for examination and training of color vision. USAF School of Aviation Medicine, Randolph Field, Tex. Project 21–02–044, Report 2 (in press).

[41] FARNSWORTH, D., and REED, J. D.: Effect of certain illuminants on scores made on pseudo-isochromatic plates. Color Vision Report 4, U. S. Naval Submarine Base, New London, Conn., 24 Dec. 1943.

[42] HARDY, L. H.; RAND, G.; and RITTLER, M. C.: Effect of quality of illumination on results of Ishihara test. J. Optic. Soc. America **36**: 86–94, Feb. 1946.

[43] SCHMIDT, I.: Further study of effect of illumination on interpretation of pseudo-isochromatic plates. USAF School of Aviation Medicine, Randolph Field, Tex. (unpublished report, Jan. 1950.

[44] GRETHER, W. F.; CONNELL, S. C.; and BJORNSTAD, J. M.: Experimental evaluation of the New London Navy Lantern for testing color perception. Air Matériel Command, Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. MCREXD–694–21 b, 1 Mar. 1949.

[45] SCHMIDT, I.: New tests for examination and training of color vision. II. Signal lamp. USAF School of Aviation Medicine, Randolph Field, Tex. Project No. 21–02–043 (in press).

[46] SLOAN, L. L., and WOLLACH, L.: Comparison of tests for red-green color deficiency. J. Aviation Med. **19**: 447–455, Dec. 1948.

[47] IMUS, H. A.: Evaluation of eye examination for flying. U. S. Naval School of Aviation Medicine and Research, Pensacola, Fla. Project X395 (Av–213–k), 1 June 1947.

The checkerboard type of target probably represents the best test of pure resolution, while the letter chart is as satisfactory for practical visual-acuity testing purposes as any other.[48] New visual-acuity test charts have been designed for testing both at 20 feet and at 14 inches. Projection types of visual-acuity charts should not be used when accurate testing is desired.

The "Manual of Instructions for Testing Visual Acuity"[49] prescribes a brightness of from 10 to 15 foot-lamberts on the chart itself with the room walls painted a gray of from 35 to 50 (preferably 40) percent reflectance. The method of uniform illumination of the room and the exact technic of giving the test are described in the manual. The candidate is given credit for any line on which he correctly reads 7 of 10 letters. He is given no credit for lines on which he reads less than 7 letters correctly.

Other recent developments in visual-acuity testing are the so-called "machine tests" using the Bausch and Lomb orthorater and the American optical sight screener. These tests are being administered by a group of nonmedical Air Force officers to see what results can be achieved in a screening test by a nonprofessional group in such a program. This may be of great value in view of the shortage of medical officers in the service. This testing program includes near and far visual acuity, near and far heterophoria, and depth perception. When administered by trained people these machine tests are as reliable as clinical tests.[50] In addition, they can be moved more readily and can be administered faster than clinical tests. When tests are to be given at several localities as by a traveling examining board, more constant test conditions are assured through the use of machine tests, and they require much less space for administration than is necessary for regular clinical tests.

Heterophoria.—No correlation has as yet been shown between extraocular muscle balance and success or failure in military visual tasks. Adequate muscle balance is required for many such tasks but the determination of exact boundaries within which a person will be satisfactory and outside of which he will be unsatisfactory has not been accomplished. Most tests of heterophoria are reliable tests of the particular aspect of heterophoria which they test, but the different tests do not correlate well with each other. This is probably because no two of them test exactly the same function. The "Manual of In-

[48] Studies in visual acuity. Personnel Research and Procedures Branch, Adjutant General, U. S. Army, Washington, D. C. Research Program PR 4075, Aug. 1947.

[49] Army-Navy Research Council Vision Committee, 1 Oct. 1947.

[50] IMUS, H. A.: Comparison of orthorater with clinical ophthalmological examinations. U. S. Naval School of Aviation Medicine and Research, Pensacola, Fla. Project X–499 (Av–268–p), Report No. 2, 1 Mar. 1946.

structions for Testing Heterophoria and Prism Divergence at Near"[51] prescribes a technic to insure consistent results between the military services.

Night vision.—At present emphasis is being placed on training in night vision because the average American has only a rudimentary idea of how to use his eyes at night. The night-blind person can be detected in a properly administered night-vision training program. Night-vision testing is limited for the most part to detection of the night blind. Accurate testing to discover persons with superior night vision are so time consuming that they can be used only for selection for some special purpose.

Depth perception.—The ability to perceive depth is important in many military occupations and especially in flying. The exact mechanism by which depth is determined varies under different circumstances and according to various observers.[52] An apparatus to measure the ability of persons to determine depth by use of the factor of motion parallax has recently been developed.[53] Results obtained on this test correlate better with flying ability than tests used previously.

INDUSTRIAL EYE CARE IN THE ARMED FORCES

All the Armed Forces now have large industrial organizations so industrial eye-protection programs are required. The Navy has recently reported outstanding results in several of its plants.[54] In one plant prior to starting the program in 1946, there were 58 eye injuries per million man-hours with a total of 232 injuries. Ten months later there were no injuries in over 2 million man-hours worked in a similar period. This is a record of which the Navy can be justly proud.

ACRYLIC PROSTHESES FOLLOWING EYE ENUCLEATIONS

All the Armed Forces now use plastic eye prostheses. They were first developed and used at Valley Forge General Hospital in the fall of 1944.[55] Since then that hospital has made 3,300 prostheses and 3,350 conformers. The advantages of plastic over glass eyes are: (1) they are not subject to erosion by the orbital secretions and therefore do not irritate the palpebral conjunctiva nor become too rough to wear; (2) they appear more lifelike; (3) they have better motility;

[51] Army-Navy National Research Council Vision Committee, 1 Oct. 1947.

[52] WEYMOUTH, F. W.: Binocular distance discrimination. Air Matériel Command, Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Report MCREXD 696–93–b, 6 July 1948.

[53] ROSE, H. W.: Motion parallax as factor of depth perception. USAF School of Aviation Medicine, Randolph Field, Tex. Project 21–02–039 (in press).

[54] SWANSON, C. A.: High lights of Navy's eye-protection, eye-correction program. Tr. Am. Acad. Ophth. (in press).

[55] SICHI, W. T.: Personal communication, Mar. 1950.

(4) they are much better in cold weather because they do not feel cold to the patient, do not fog, and they do not cause a loss of much body heat; (5) the colors are permanent as they do not fade or darken; (6) they give the patient a feeling of security because they do not break when dropped; and (7) they can be adjusted or reconstructed after being worn for some time.

The less the prosthesis is removed, the less secretion and irritation is produced. These prostheses may be left in the socket from a week to a month without producing a fetid odor or appreciable secretion. Orbital implants are important in getting good results after enucleations or eviscerations. The implants help maintain proper orbital and palpebral contour, prevent sagging of the upper lid, and aid in giving motility to the prosthesis. Of all the types of implants tried, the buried type of acrylic implant with tantalum mesh is the most satisfactory. The peg type is unsatisfactory because, although it gives wonderful motility, it is too easily extruded.

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The Eosinophil as an Aid in Clinical Diagnosis

JACQUES L. SHERMAN, JR., *Captain, MC, U. S. A.*[1]

WITHIN recent years the clinician's attention has been directed to the eosinophil by the fact that (1) in both civilian and military medicine there has been an increase in the number of patients with "tropical" diseases, generally associated with eosinophilia; (2) there has been a revolutionary development in the appreciation of the role of the adrenal cortex in disease processes and of the relationship of this principle to the eosinophil; and (3) simple, accurate methods for counting eosinophils, available to even the smallest laboratory, have been developed. Thus, knowledge about the eosinophil and the eosinophil response is becoming more valuable to the physician in his daily practice.

The eosinophil is a polymorphonuclear granulocyte of the same size as the neutrophil, having a nucleus which is usually bilobed, slightly larger and less deeply stained than the nucleus of the neutrophil. The granules of the eosinophil are characteristic, being coarse, uniformly large and ovoid, and taking a deep red stain. These cells are less motile than neutrophils, but they show phagocytosis and chemotropism of the same order as neutrophils. They are known to contain iron, oxidase, peroxidase, and histamine. There has been much controversy about the origin of these cells, but it appears that they are formed in the marrow from eosinophilic myelocytes. Their function seems to be related to removal or detoxification of foreign material, and it is believed that the eosinophil is a part of the body defenses against invasion by heterogenous proteins.

Normal values.—In the peripheral blood of adults there are normally from 50 to 300 eosinophils per cu. mm., or from 0 to 5 percent on differential count. Normal ranges in children are from 50 to 700, averaging about 300 per cu. mm., or from 0 to 8 percent of the leuko-

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cytes. For bone marrow the eosinophils range from 450 to 750 per cu. mm., or 0.5 to 4 percent.

The total eosinophil count.—Direct chamber counting has many advantages over differential counting on stained smears: it is more accurate, more rapid, and gives information not available by other methods. Anyone who has made differential counts is aware of the significant variations in results possible when searching for eosinophils in different areas of the slide. Because eosinophils are relatively few in number, small errors are of significance in determining the total. Even with neutrophils and lymphocytes, which occur in much greater numbers, there is great variation in counts by different observers, or by the same observer in different areas of the smear.[2,3] In order to obtain the total number of eosinophils, it is necessary to combine the results obtained from the differential count with the total leukocyte count, thus requiring two procedures, in each of which there is some inherent error. On the other hand, the direct eosinophil count requires only one operation and both the total eosinophil count and the total leukocyte count can be made from the same preparation, thus achieving rapidity and efficiency. Furthermore, when there is eosinopenia, only direct counts are of value in following the course of the cells.

As to the accuracy of the direct count, a careful statistical analysis is available which demonstrates that this method is consistently more accurate than a 200-cell differential count.[4] Even greater accuracy is obtained by using the technic and criteria described below.[5] We have found the results reproducible both on the same sample and by different observers. In routine ward work when a total leukocyte count is needed, this technic can be used inasmuch as it requires the same equipment. The advantage is that, at the same time that the total leukocyte count is made, quick scanning of the chamber can be accomplished, and, if there appears to be an eosinopenia or eosinophilia, a direct count can be made. Using this technic, clinical entities may be discovered which otherwise might be unsuspected.

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[2] MACGREGOR, R. G. S.; RICHARDS, W.; and LOH, G. L.: Differential leukocyte count. J. Path. & Bact. 51: 337–368, Nov. 1940.

[3] BARNETT, C. W.: Unavoidable error in differential count of leukocytes of blood. J. Clin. Investigation 12: 77–91, Jan. 1933.

[4] RANDOLPH, T. G., and STANTON, C. L.: Comparison of differential counts from stained film and counting chamber using propylene glycol-aqueous stain. Am. J. Clin. Path., Tech. Sect. 9: 17–22, Mar. 1945; abstr., Comparison of counting chamber and stained film differential counts; further use of propylene glycol-aqueous stain. Proc. Central Soc. Clin. Research 17: 44, 1944.

[5] Note that in the total count each eosinophil in the chamber represents only 5.5 cells in the peripheral blood, while on the differential smear each eosinophil seen may represent from 40 to 100 cells in the circulating blood.

Technic of the direct eosinophil count.—Necessary materials include an ordinary white blood cell pipette, a standard counting chamber, and diluting fluid. Blood is drawn into the pipette to the mark 1 and the diluting fluid to the mark 11, making a dilution of 1:10. The mixture is shaken gently for 5 minutes; 2 drops are blown out and one side of the counting chamber is filled. The pipette is shaken again to insure good distribution of cells; 2 drops are blown out and the other side of the chamber is filled. The cells are allowed to settle for a few minutes before counting. Under ordinary substage illumination all of the leukocytes will be visible, the eosinophils appearing slightly pinker than the other cells or the background. Increasing the illumination by raising the substage condenser, opening the iris diaphragm wide and using a strong central light will obliterate all cells but the eosinophils.

All of the eosinophils in the entire ruled area of one chamber (9 sq. mm.) are counted, and this is repeated on the other side so that all 18 ruled squares are included. This can be done with the low-power objective, and any questionable cells can be positively identified by switching to the high-dry objective. The total number of eosinophils per cu. mm. of blood is then calculated by the following formula:

$$\frac{\text{total number of cells counted}}{18} \times 100;$$

i. e., total for 18 squares divided by 18 × 10 (correction for dilution) × 10 (correction for chamber depth). More simply, the total number of cells counted multiplied by 5.5 will give the total number of eosinophils per cu. mm. of blood.

Special precautions must be taken to insure accuracy because there are relatively few eosinophils in the blood and small errors are greatly magnified in the end results. Exact dilution, proper shaking, correct filling of the chamber, and careful counting must be observed. If the number of cells on one side varies from that of the other side by more than 10 percent, it should be assumed that cell distribution is poor, and another chamber should be filled and counted. The total leukocyte count can be obtained from the same preparation by simply reducing the amount of light entering the chamber from below. It must be remembered, however, that the dilution factor here is 1:10 and not 1:20 as in the ordinary leukocyte count.

Diluting fluid.—There is, at present, no diluting fluid which is ideal in all respects, but there are several which are satisfactory for routine use. The diluents of one group are modifications of Dunger's original fluid, i. e., combinations of eosin, acetone, and water. The fluid used

by Thorn and coworkers [6 7] is quite unstable and therefore is difficult to use in routine ward and laboratory work. We have used a diluent prepared at the Georgetown University Hospital [8] and have found it to be satisfactory. It is made as follows.

Aqueous eosin, 1 percent	10 cc.
Acetone	25 cc.
Distilled water, q. s. ad	100 cc.

The only undesirable feature of this diluent is the fact that the leukocytes begin to swell and to rupture in from 30 to 60 min. after mixing. Thus, difficulties arise in rechecking counts, in teaching, in having other observers repeat the count, in making several simultaneous counts, or in refilling another chamber if distribution was poor on the first. This fluid is unstable if kept at room temperature for more than 2 or 3 days, so it should be stored in a refrigerator.

The other type of diluent, described by Randolph,[9 10] is a propylene glycol aqueous stain. This is stable at room temperatures for from 6 to 8 weeks and does not destroy leukocytes so that counts may be made at any time after filling the pipette. It has been the experience of some observers that the eosinophils do not stain very well, but with the optical method of reduction of unstained cells described above, no difficulty has been noted in obtaining accurate and reproducible counts. This fluid is prepared by using:

Solution 1

0.1 percent methylene blue in propylene glycol	50 cc.
Distilled water	50 cc.

Solution 2

0.1 percent phloxine in propylene glycol	50 cc.
Distilled water	50 cc.

Equal parts of solutions 1 and 2 are mixed in a test tube. This mixture remains stable for about 4 hours after which time there is some precipitation of dye.

Solution 2 may be used as a diluting fluid by itself, if simplicity is desired. This eliminates the necessity for preparing two solutions and for mixing them when counts are to be made. The disadvantages

[6] FORSHAM, P. H.; THORN, G. W.; and PRUNTY, F. T. G.: Clinical studies with pituitary adrenocorticotropin. J. Clin. Endocrinol. 8: 15–66, Jan. 1948.

[7] THORN, G. W.; FORSHAM, P. H.; PRUNTY, F. T. G.; and HILLS, A. G.: Test for adrenal cortical insufficiency; response to pituitary adrenocorticotropic hormone. J. A. M. A. 137: 1005–1009, July 17, 1948; correction 137: 1544, Aug. 21, 1948.

[8] RATH, C. F.: Personal communication.

[9] RANDOLPH, T. G.: Blood studies in allergy: direct counting chamber determination of eosinophils by propylene glycol aqueous stains. J. Allergy 15: 89–96, Mar. 1944.

[10] RANDOLPH, T. G.: Differentiation and enumeration of eosinophils in the counting chamber with a glycol stain; a valuable technique in appraising ACTH dosage. J. Lab. & Clin. Med. 34: 1696–1701, Dec. 1949.

are that staining of the eosinophils is not as good and that chamber differential leukocyte counts cannot be made. Personal experience indicates, however, that it is an adequate diluent for routine use. Henneman et al.[11] at the Army Medical Service Graduate School used this solution in their study of diluting fluids. They found Randolph's propylene-glycol-phloxine stain more stable and reliable than the eosin-acetone diluent used by Thorn.[12]

Experimental studies on eosinophilia.—Much experimental work has been done to explain the basic causes of eosinophil production. From this work several principles can be derived which help to explain the eosinophilia which is characteristic in certain diseases. Almost all true allergic conditions are associated with eosinophilia, and investigations into the antigen-antibody mechanism have demonstrated the relationship of this mechanism to eosinophil production. For example, it has been shown that, although these cells have a definite chemotropism toward protein materials, there is no relationship between the degree of eosinophil response and the amount of material. Eosinophils show greater chemotropism in vitro toward split protein factors, such as Witte's peptone, than to keratins extracted from *Trichinella*,[13] but under conditions necessary for antigen-antibody response there is a definite production of eosinophils. Thus, a single injection of protein will cause eosinophilia only when the protein is antigenic and relatively insoluble so that the antigen remains in the body, and after sufficient time has elapsed for antibodies to have been formed.[14]

Another demonstration of the relationship of eosinophils to sensitization phenomena is by the production of a local and general eosinophilia following repeated injections at 3-day intervals of soluble protein into experimental animals. In this experiment it was seen that no eosinophil response followed the first injection, but that there was an increasing eosinophilia following each subsequent injection. This reaction could not be produced by injections of protein-free material.[15] The experiments of Opie and Rous, cited by Kirk,[16] also demonstrate the relation of protein to eosinophils. They showed

[11] HENNEMAN, P. H.; WEXLER, H.; and WESTENHAVER, M. M.: Comparison of eosin-acetone and phloxine-propylene glycol diluents in eosinophil counts. J. Lab. & Clin. Med. 34: 1017–1020, July 1949.

[12] For a discussion of the relative merits of these various diluents see RANDOLPH, T. G., and ROLLINS, J. P.: Eosinophil observations in adrenocorticotrophic hormone (ACTH) therapy. Proceedings of the First Clinical ACTH Conference. The Blakiston Co., Philadelphia, Pa., 1950. pp. 1–13.

[13] INGRAHAM, E. S., and WARTMAN, W. B.: Chemotropism of human eosinophilic polymorphonuclear leukocytes. Arch. Path. 28: 318–322, Sept. 1939.

[14] CAMPBELL, D. H. (Chicago): Experimental eosinophilia with keratin from Ascaris suum and other sources. J. Infect. Dis. 71: 270–276, Nov.–Dec. 1942.

[15] BIGGART, J. H.: Some observations on eosinophile cell. J. Path. & Bact. 35: 799–816, Sept. 1932.

[16] KIRK, R. C.: Causes of eosinophilia. Internat. Clin. 1: 219–233, Mar. 1942.

that there were few eosinophils in the blood or lymph of starved animals, but that feeding with protein produced a great increase in the number of these cells in the thoracic duct and in the blood.

Noguchi, in 1912, first noted eosinophilia following splenectomy. The exact cause of this phenomenon is still being investigated, but it is suggested that it may be on the basis of a splenic hormone. Injection of a protein-free splenic extract will reduce the eosinophilia of splenectomized animals but will not affect the eosinophil level of normal animals. These studies may help to explain the basic causes of eosinophilia, common to allergic states, extensive skin lesions, parasitism, and certain types of poisoning. Abnormal or split proteins can be implicated in each of these conditions.

The eosinophil response.—Hills et al.[17] showed that there is a characteristic fall in circulating eosinophils and lymphocytes following the injection of adrenocorticotropic hormone (ACTH) in man. It was demonstrated that this response depends on a competent adrenal cortex and this principle is the basis for tests of adrenal function. The 4-hour ACTH test described by Thorn [7] is performed as follows: a total eosinophil count is made on the fasting patient who is then given 25 mg. of ACTH intramuscularly. Four hours later the total eosinophil count is repeated. A fall in circulating eosinophils of 50 percent or more is interpreted as indicating normal response of the patient's adrenal cortex.

A test based on the same response to ACTH may be performed with epinephrine. After determining the fasting total eosinophil count the patient is given 0.3 cc. of 1:1,000 epinephrine subcutaneously. After 4 hours the eosinophil response is measured, and a fall of 50 percent or more indicates normal adrenal function. The response to this test depends on stimulation of the pituitary to produce ACTH and on the response of the adrenal cortex to this ACTH.[18] The eosinophil response must be interpreted as a measure of a nonspecific stress reaction of the intact organism. Eosinopenia of the type seen following ACTH or epinephrine administration is also noted after surgical operations,[19 20] electroshock therapy,[21] glucose adminis-

[17] HILLS, A. G.; FORSHAM, P. H.; and FINCH, C. A.: Changes in circulating leukocytes induced by the administration of pituitary adrenocorticotrophic hormone (ACTH) in man. Blood 3: 755–768, July 1948.

[18] ALMY, T. P.; LARAGH, J. H.; and COHEN, E. J.: Response of circulating eosinophils to epinephrine as an index of adrenal cortical function. New York Med. 6: 16–19, June 1950.

[19] ROCHE, M., ET AL.: The levels of circulating eosinophils and their response to ACTH in surgery; their use as an index of adrenal cortical function. Proceedings of the First Clinical ACTH Conference. The Blakiston Co., Philadelphia, Pa., 1950. pp. 55–69.

[20] THORN, G. W.: Studies on pituitary-adrenal relationships. Tr. Am. Clin. & Climatol. Assoc. 60: 168–183, 1949.

[21] ALTSCHULE, M. D.; PARKHURST, B. H.; and TILLOTSON, K. J.: Decreases in blood eosinophilic leukocytes after electrically induced convulsions in man. J. Clin. Endocrinol. 9: 440–445, May 1949.

tration,[22] coronary occlusion, hepatic coma,[20] nitrogen-mustard therapy, cardiac failure,[23] infection, and other conditions of stress. In patients with Addison's disease no fall in eosinophils is seen following severe infections because the adrenal mechanism is not intact.[20] For the same reason, there is no eosinopenia in patients with the Waterhouse-Friderichsen syndrome, but because of rapid adrenal failure, there is a rise in the total eosinophil count.[24]

Eosinophils in infectious disease.—Simon in 1906 described the disappearance of eosinophils from the peripheral blood early in the course of acute infection, and stated that the return of these cells was the beginning of the period of convalescence. In 1929, Schilling described the hemogram in terms of a regeneratory or degeneratory reaction of the marrow to infection, and correlated this with the eosinophil response. In acute infection with good body response there is regeneratory activity with leukocytosis, many juvenile forms, and disappearance of eosinophils. After the acute stage has passed, the leukocytosis lessens, the "shift to the left" decreases, and eosinophils return. Later there is a relative lymphocytosis and eosinophilia, and a return of the granulocytes to normal adult forms. Failure of the eosinophils to return is considered a bad prognostic sign, and is usually found in severe, toxic infections in which the degeneratory reaction is seen with few young forms and lack of leukocytosis.[25]

With attention being directed to the role of the adrenal cortex in stress phenomena, and with the demonstration of an eosinophil response to the 11-oxycorticosteroids of the adrenals, it is now possible to interpret the course of the eosinophils as described above. With intact and operating body defenses, there is response to infection on the part of the pituitary-adrenal mechanism causing over-production of cortical steroids which reduces the level of circulating eosinophils. The eosinophilia of convalescence may be explained as a manifestation of the compensating state of the pituitary-adrenal mechanism. The eosinopenia in most acute viral or bacterial infections is of the order of from 5 to 30 per cu. mm., and the rise during convalescence is generally to levels of from 500 to 800 per cu. mm.

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[22] JORDAN, P. H., ET AL.: Eosinopenia due to glucose administration. Proc. Soc. Exper. Biol. & Med. 73: 243–246, Feb. 1950.

[23] ELLIOTT, J. M.: Observations of the levels of circulating eosinophils in congestive heart failure; the possible role of the adrenal cortex in cardiac edema: preliminary report. Lahey Clin. Bull. 6: 251–255, Apr. 1950.

[24] FALOON, W. W., ET AL.: The use of the direct eosinophil count in the diagnosis and treatment of Waterhouse-Friderichsen syndrome. New England J. Med. 242: 441–445, Mar. 23, 1950.

[25] WHITBY, L. E. H., and BRITTON, C. J. C.: Disorders of the Blood. 5th edition. The Blakiston Co., Philadelphia, Pa., 1948.

Certain infectious diseases vary from the typical pattern described above. In scarlet fever there is a rapid increase in the number of eosinophils, which reaches a maximum by about the sixth or seventh day, often reaching 20 percent of the differential count, or from 3,000 to 5,000 per cu. mm. This generally persists until the third week of the disease.[26] A similar response is noted in chorea[27] and it is believed by some investigators that the eosinophilia suggests the basic allergic nature of these two conditions. Pulmonary tuberculosis is not often associated with an eosinophil response in the acute stage, but there is frequently a moderate eosinophilia of from 300 to 500 in chronic stages. Significant eosinophilia develops in the marrow and peripheral blood in patients treated with streptomycin and old tuberculin.[28] Kirk[16] stated that typhoid fever is one disease in which there is complete suppression of eosinophils, and reported a series of 25 cases in which an eosinophil count of 2 percent was the highest recorded during the hospitalization of these patients.

SUMMARY

Although the exact role of the eosinophil in physiologic and pathologic processes is not known, there is enough correlation between eosinophil levels in the blood and certain clinical states to make information about these cells useful to the practitioner.[16 29] Generally, there is an increase in the total eosinophil count in conditions associated with hypersensitivity reactions such as those seen in allergic states and in parasitic infestation. Eosinophilia is also seen with certain destructive skin lesions, the "collagen" diseases, certain poisonings, and certain other conditions possibly related to foreign protein and sensitivity reactions. It is also a feature of certain blood and marrow disturbances.

Eosinopenia is characteristically seen in response to stress phenomena caused by infection, surgical operation, and many other traumatic conditions. Recovery from the stress state is marked by a return of eosinophils to normal or high levels. This does not occur if the adrenal cortex is incompetent or if body defenses are failing. Thus, if the eosinophil level remains low beyond the expected time for recovery, the physician has objective evidence of a poor prog-

[26] FRIEDMAN, S.: Eosinophilia in scarlet fever as diagnostic aid. Am. J. Dis. Child. 49: 933–938, Apr. 1935.

[27] BERGER, H. C.: Eosinophilia occurring in chorea. Am. J. Dis. Child. 21: 477–483, May 1921.

[28] JACOBS, E. C., and GLAZENER, F. S.: Eosinophilia artificially produced by streptomycin and old tuberculin. To be published.

[29] STICKNEY, J. M., and HECK, F. J.: Clinical occurrence of eosinophilia. M. Clin. North America 28: 915–919, July 1944.

nosis, and therapeutic measures may be instituted at the proper time. This guide has already been used in preoperative and postoperative management[19 20] and in the Waterhouse-Friderichsen syndrome.[24] With further investigation and trial at the clinical level the response of eosinophils will become an even more useful guide to the practitioner in diagnosis, management, and prognosis.

Surgical Gingivectomy in Periodontal Disease

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IN CONSIDERING the importance of surgical gingivectomy in periodontal treatment, it should be stressed that this treatment is only one of several treatments available to the operator. It is not my intention to elevate surgical gingivectomy to the status of a panacea for all periodontal disease, but rather, to explain its use, indications, and technic.

Periodontal disease (or more commonly, pyorrhea) affects the surrounding and supporting structures of the teeth. It may be degenerative or inflammatory, local or systemic, and mild or severe. Beyond the age of 50 years periodontal disease is responsible for the loss of more teeth than is dental caries. Briefly the mechanism of the disease is as follows: (1) A small pocket forms between the gum and the tooth; (2) food, debris, calculus, or organisms lodge in this pocket; (3) this produces inflammation, which in turn causes bone loss at the base of the pocket; and (4) the bone loss deepens the pocket and more debris packs into it causing further inflammation. Thus a vicious cycle progresses until ultimately the tooth is lost through lack of bony support.

The only effective treatment found so far is the elimination of the pocket and maintenance of good oral hygiene. If systemic diseases such as diabetes or nephritis are influencing the periodontal lesion, they too must be controlled if the treatment is to be successful. Eliminating the systemic factors will not, however, correct the damage already done to the periodontal tissues, nor will it eliminate the vicious cycle under way in the periodontal pocket. Our problem then is to treat the periodontal tissues after we have eliminated the local or systemic causes.

There are two types of treatment, conservative and radical. The conservative type consists of local treatment such as (1) scaling the

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teeth and curetting the pockets to keep them thoroughly clean, (2) the institution of good oral hygiene and toothbrush technic, and (3) the use of mild astringents to help reduce the edema. This treatment is intended gradually and gently to eliminate the pocket and restore the tissues to good health. When possible and if it produces satisfactory results this is the treatment of choice. Unfortunately, there are a great number of patients in whom the condition is too far advanced, or the pocket is too deep, or for some reason the tissue does not respond to conservative treatment. We must then use a more radical treatment on these patients.

Radical treatment can be of two types: removal of the soft tissues to eliminate the pocket or extraction of the tooth. Elimination of the soft tissue boundaries of the pocket is more radical than the conservative treatment described but far less radical than extraction. Dental extraction is indicated in many patients in whom the condition has progressed too long, or too rapidly, and has left the tooth with so little support that even if the pocket were eliminated the tooth could not withstand the stress of function, but any case which fails to respond to conservative treatment, and yet is not so advanced that extraction is indicated, should receive the benefits of gingivectomy.

Gingivectomy is intended to prevent the continued advance of periodontal disease which does not respond to conservative treatment. In this way the pocket is eliminated and conservative treatment may then prove effective in controlling the disease. Gingivectomy does not cure periodontal disease; it is only an adjunct to treatment. The advantages of gingivectomy are (1) retention of the natural dentition in a healthy state for many years, (2) elimination of tedious, time-consuming treatments which may keep the condition from becoming worse but cannot induce healing because the condition is too far advanced, (3) elimination of the periodontal pocket with its associated infection, bad taste, foul breath, et cetera, and (4) allowing the retention of important individual teeth to serve as abutments and retainers.

The disadvantages of gingivectomy are principally the patient's fear of the procedure and hesitation as to the appearance of the tissues and teeth following gingivectomy. Both of these disadvantages can be minimized or overcome completely by the skill of the operator, the confidence the patient has in the operator, and the mental attitude the operator instills in the patient prior to the procedure. The operation can be satisfactorily performed under local anesthesia, but if the patient is extremely apprehensive, premedication is indicated, and even general anesthesia may be used.

The two types of gingivectomy generally employed are surgical excision and electrocautery. There is a small, steadily diminishing group of proponents of chemical treatment. The difficulties involved in chemical treatment are: (1) the drugs employed are not self-limiting and can destroy healthy tissue; (2) drug application to local areas is difficult as saliva spreads the drug into areas where its effect is not desired; (3) there can be toxic manifestations in the use of any drug, particularly escharotics; (4) numerous repeated applications of the drug are required to produce the effect, thus prolonging the treatment and healing time; and (5) there may be residual drug effects such as necrosis, sloughing, irritation, and inflammation after the procedure is completed.

Those who prefer electrocautery stress the fact that there is little hemorrhage, and if hemorrhage occurs it can easily be controlled. They believe the procedure is quicker and less tiring for the operator. Those who favor surgical excision believe that electrocautery has the following disadvantages: (1) the depth of penetration of the instrument's effect is not accurately known, (2) treatment is often followed by bone slough caused by injury to healthy bone, (3) there is some question as to the effect of electrocautery on the vitality of the teeth, (4) postoperatively the tissues react as they would after any burn, (5) prolonged healing time is often observed following this procedure, and (6) the patient may object to the odor which accompanies the use of this instrument and which often remains with the tissue for some time after its use.

The disadvantages of surgical excision are (1) the procedures usually produce profuse bleeding, particularly in flabby or spongy tissue, (2) the procedures are physically tiring on the operator, and (3) raw surfaces are created which may be extremely painful immediately after the effects of the anesthetic have worn off.

The Periodontia Section of the Dental Service at this hospital has favored surgical gingivectomy for the last few years and has obtained excellent results with it. The general procedure is as follows: The patient receives a thorough prophylaxis followed by conservative treatment for several weeks. If the disease is far advanced, plans are made for a gingivectomy. If the disease is not far advanced, gingivectomy is not planned unless conservative treatment fails. Gingivectomy is not undertaken routinely but is used only when indicated. A complete roentgenographic study of the mouth, including bite wings and models, is made. Not only is this used to plan the surgical procedures and as reference during the operation, but also as an aid in educating the patient. A gingivectomy will not be undertaken unless the patient not only agrees to the procedure, but also

agrees to follow rigid postoperative instructions. All phases of the procedure, its purpose and the expected esthetic result, are explained to the patient beforehand. The wider the embrasures, the less is the likelihood of a satisfactory esthetic result.

Once the preliminary steps are completed, the patient is given an appointment for the gingivectomy. Usually the anesthetic is local infiltration with a 2 percent procaine hydrochloride and epinephrine 1:50,000 mixture. Premedication is not used routinely but it is available if the operator believes it is necessary. If 2 percent procaine hydrochloride does not induce sufficient anesthesia, a 4 percent solution with or without epinephrine is available. Medical clearance is obtained on all patients. Because the operation is elective, patients with systemic involvements which would rule out other minor operations are not subjected to it.

A modification of the Crane-Kaplan[2,3] technic is used at this hospital. It is efficient and rapid, and eliminates many of the objections to surgical gingivectomy suggested by the proponents of electrocautery. The depth of the pockets is marked with pocket marking forceps (producing bleeding points), then a sharp incision is made following the pocket depth, thus producing a festooning effect. The knife is held at a slight bevel from the perpendicular, to allow for rounding off the tissues. Crane and Kaplan designed a set of special knives for this procedure. These knives cut more effectively, particularly in the interproximal areas, than an ordinary scalpel and were designed in pairs of right and left instruments. The original knives of this type had blunt dissectors, shaped like the knives, on the other end of the handles which were then used to dissect out the tissue which had been cut free. Recently the instruments were modified so that the right and left knives are now on opposite ends of the same handle. The dissectors, too, are now on opposite ends of the same handle. Following the excision of the diseased tissue, scalers and files are used. The principle here is gradually to work down from the larger to the smaller instruments and ultimately finish with the delicate files. In this way the diseased tissue is completely removed, and the healthy tissue which is left behind receives very little trauma and thus heals more quickly.

The postsurgical dressing should (1) protect and soothe the tissues, but must not act as a foreign body, thus prolonging the healing time; (2) be relatively simple to apply and remain fixed in place once properly applied; (3) be readily available and not so expensive as to limit

[2] CRANE, A. B., and KAPLAN, H.: The Crane-Kaplan operation for the prompt elimination of pyorrhea alveolaris. Dental Cosmos 83: 643, 1931.

[3] CRANE, A. B., and KAPLAN, H.: The technique and results of surgical pyorrhea treatment. Dental Digest 38: 2, 1932.

its use; and (4) be adaptable enough to permit the patient considerable normal function (speaking, chewing soft foods, normal tongue movements, et cetera). Many commercial dressings meet most of the above requirements fairly well. The dressing used at this hospital is composed of zinc oxide, finely powdered rosin, eugenol, and oil of bitter almond.

The mixture is spatulated to a heavy, ropy consistency. It is applied gently around the necks of the teeth. Care must be taken to avoid interference with occlusion. The adaptation must be accurate, as a poorly adapted dressing has a greater tendency to break, become loose, or move and thus irritate the tissue. The dressing is changed at the end of the fifth day and is removed completely after the tenth day. Despite microscopic studies which show the importance of the full 10 days' protection, some of our patients have healed promptly even though the pack has been lost after 2 or 3 days and the patient has been unable to come in and have the pack replaced.

Once the pack has been removed, the patient is put on a rigid regime of home care. This includes the use of a mild saline mouthwash, correct tooth-brushing, interdental stimulation, and tissue massage. The patient is seen periodically for conservative treatment and evaluation of the adequacy of his home care. The time between visits is gradually extended until the periodontal tissues reach a satisfactory state, then only the routine semiannual check-up is needed to be certain that the condition remains under control.

CONCLUSION

The success of this method depends on the careful selection of cases and the preoperative and postoperative cooperation of the patient.

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An Emulsion of Hexachlorocyclohexane for Scabies

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SCABIES is one of the most troublesome diseases the military dermatologist is called on to treat. It was one of the leading dermatologic afflictions responsible for the loss of countless man-hours in World War II.[2] The treatment with sulfur or benzyl benzoate left much to be desired. Kornblee and Combes [3] stated that the clinical response to the sulfur treatment was often erratic, necessitating repeated applications. Cannon and McRae,[2] on the other hand, found benzyl benzoate to be irritating when used in different pharmaceutical forms and Shane [4] found it a sensitizing agent, often sensitizing the patient to wool. There is a need for a nontoxic prompt-acting preparation that can be applied with a minimum of effort. It is my purpose here to present a formula of this type.

A compound known as hexachlorocyclohexane (666) first manufactured in the early part of the nineteenth century appeared to offer a solution to the scabies problem. Although the gamma isomer of this compound was known for a long time, it was first isolated during the period 1942–43 in pure form and found to have strong insecticidal properties.[5] The gamma isomer in the last few years has been used in a vanishing cream base with great success and was found to be an efficient and apparently nontoxic cure for scabies and pediculosis, but it required much time to apply. An emulsion that could be brushed

[1] U. S. Naval Hospital Corps School, U. S. Naval Hospital, San Diego, Calif.

[2] CANNON, A. B., and MCRAE, M. E.: Treatment of scabies; report of 100 patients treated with hexachlorocyclohexane in vanishing cream base. J. A. M. A. 138: 557–560, Oct. 23, 1948.

[3] KORNBLEE, L. V., and COMBES, F. C.: Gammexane in treatment of scabies. Arch. Dermat. & Syph. 61: 407–412, Mar. 1950.

[4] SHANE, S. J.: Benzyl benzoate and wool dermatitis. Canad. M. A. J. 54: 39–42, Jan. 1946.

[5] SLADE, R. E.: The gamma isomer of hexachlorocyclohexane. Chem. & Indust. 64: 40 and 314, 1945.

on the skin was deemed more desirable and would do away with the former time-consuming methods of application.

The following is a formula for an emulsion of this type:

$C_6H_6Cl_6$ (gamma isomer)	1.0	Sodium lauryl sulfate	0.5
Stearyl alcohol	3.0	PEG[6] 400 monolaurate	1.0
Cetyl alcohol	2.0	Aqua q. s. ad	100.0
Cotton seed oil	10.0		

A. Dissolve the $C_6H_6Cl_6$ in the oil by heating gently on a water bath; add the cetyl and stearyl alcohol and heat to 70° C.

B. Heat the distilled water to 70° C. in which the sodium lauryl sulfate and PEG 400 monolaurate have been dissolved.

Add B to A stirring rapidly until cool and homogenize.

Early clinical trials with this lotion were encouraging. Irritation and toxic side reactions appear to be minimal. Toxic reactions to $C_6H_6Cl_6$ can be treated with barbiturates.[7] It is believed that the lotion destroys the eggs as well as the parasites. It is stable at room temperature and with most compounds and it possesses the qualities of being washable and stainless. Dilute alkali, however, is to be avoided as trichlorobenzene will result from the decomposition of $C_6H_6Cl_6$ rendering it inactive. By varying the amounts of cetyl and stearyl alcohol employed, the resulting emulsion can be made to conform to any desired thickness and viscosity. The lotion can be prepared with a minimum of expense and effort and shows great promise of solving the scabies problem in the Armed Forces.

[6] Polyethylene glycol.

[7] McNAMARA, B. P., and KROP, S.: Observations on pharmacology of isomers of hexachlorocyclohexane. J. Pharmacol. & Exper. Therap. 92: 140–146, Feb. 1948.

Prevention of Air Sickness by Benadryl-Scopolamine Mixtures

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IT HAS recently been shown that the effectiveness of beta dimethylaminoethyl benzohydryl ether 8-chlorotheophyllinate (dramamine) against motion sickness resides in the basic portion of the molecule and is not a unique property of this particular salt. Thus, beta dimethylaminoethyl benzohydryl ether hydrochloride (benadryl) has proved equally as effective as dramamine in the airplane [3] and aboard ship.[4 5] A combination of 50 mg. of benadryl with 0.65 mg. of scopolamine hydrobromide proved to be the most effective prophylaxis thus far reported against airsickness.[3] Because both scopolamine and benadryl have side effects (dry mouth, blurred vision, drowsiness) which are undesirable for flying personnel it became important to test the effectiveness of reduced doses. The dose of each component of the mixture was therefore halved (0.33 mg. of scopolamine hydrobromide and 25 mg. of benadryl) and their effectiveness against airsickness again studied.

Scopolamine hydrobromide in doses of 0.65 mg. and a mixture of 25 mg. of benadryl with 0.33 mg. of scopolamine hydrobromide were distributed in capsules of identical size and appearance 1 hour prior to take-off. The testing procedure was the simulated turbulence technic perfected by Strickland et al.[6] The results are shown in

[1] USAF School of Aviation Medicine, Randolph Field, Tex.
[2] Station Hospital, Ellington Air Force Base, Tex.

[3] CHINN, H. I., and OBERST, F. W.: Effectiveness of various drugs in prevention of airsickness. Proc. Soc. Exper. Biol. & Med. 73: 218, 1950.

[4] WRIGHT, W. L.: Effectiveness of newer drugs in seasickness. U. S. Armed Forces M. J. 1: 570–577, May 1950.

[5] CHINN, H. I.; NOELL, W. K.; and SMITH, P. K.: Prophylaxis of motion sickness; evaluation of some drugs in seasickness. (Unpublished.)

[6] STRICKLAND, B. A.; HAHN, G. L.; and ADLER, H.: Studies on airsickness. J. Aviation Med. 21: 90, 1950.

table 1. The difference in the percent of airsick subjects between the two groups is not significant

TABLE 1.—*Effectiveness of benadryl-scopolamine mixture during simulated turbulence*

Preflight medication	Dose (mg.)	Subjects	Airsick (vomited)	
			Number	Percent
Scopolamine hydrobromide	0.65	60	18	30
Benadryl Scopolamine hydrobromide	25.00 .33	60	21	35

Because final evaluation of the desirability of any preparation must be its performance under usual flying conditions, our next test was to determine the degree of protection obtained with the benadryl-scopolamine mixture in regular navigation training flights. From 30 to 60 minutes prior to take-off a capsule containing (1) 0.65 mg. of scopolamine hydrobromide, or (2) a mixture of 0.33 mg. of scopolamine hydrobromide and 25 mg. of benadryl, or (3) a lactose placebo was given to each subject. The capsules were of identical size and appearance. The subjects were so placed that there was no difference in seating arrangement among the various groups. A modified C–47 (DC–3) was employed in all flights. The duration of the flights was from 4 to 6 hours, with weather conditions varying from calm to moderate turbulence. The altitude during most of each flight was from 5,000 to 7,500 feet and in no instance above 10,000 feet. Most of the trainees had previous flying experience; less than 10 percent were making their first flight. The incidence of airsickness is shown in table 2. Unfortunately, the distribution in groups was not exactly even because of the failure of some subjects to complete their questionnaires. No person receiving the benadryl-scopolamine mixture reported either severe nausea or vomiting. Severe nausea and vomiting occurred in 7.3 percent of those receiving 0.65 mg. of scopolamine hydrobromide alone and in 16.7 percent of the group receiving the placebo.

TABLE 2.—*Effectiveness of drugs against airsickness*

Preflight medication	Dose (mg.)	Subjects	Slight nausea (percent)	Severe nausea (percent)	Vomited (percent)	Percent protection [1]
Benadryl Scopolamine hydrobromide	25.00 .33	62	8.1	0	0	100.0
Scopolamine hydrobromide	.65	68	4.4	2.9	4.4	60.4
Placebo		54	14.8	5.6	11.1	

[1] Percent who received placebo who vomited minus percent who received drug who vomited divided by percent who received placebo who vomited.

When only those persons who had been airsick on some earlier flight were considered, the differences among the groups became even more pronounced (table 3). There was no vomiting or severe nausea among those receiving the mixture; 9 percent in the group receiving scopolamine hydrobromide and 20.6 percent in that receiving the placebo.

TABLE 3.—*Effectiveness of drugs among those previously airsick*

Preflight medication	Dose (mg.)	Subjects	Slight nausea (percent)	Severe nausea (percent)	Vomited (percent)	Percent protection [1]
Benadryl	25.00	31	12.9	0	0	100.0
Scopolamine hydrobromide	.33					
Scopolamine hydrobromide	.65	44	6.8	4.5	4.5	69.4
Placebo		34	20.5	5.9	14.7	

[1] See table 2.

The side effects of the drugs are shown in table 4. There was no difference in the incidence of drowsiness among the various groups. Those receiving benadryl-scopolamine mixture had as great an incidence of dry mouth as those receiving the larger dose of scopolamine hydrobromide, but there was a slight decrease of other side effects such as blurred vision, nervousness, excessive fatigue, and headache among the former group.

TABLE 4.—*Incidence of side effects*

	Benadryl-scopolamine mixture	Scopolamine hydrobromide	Placebo
	Percent	*Percent*	*Percent*
Nervousness	0	7.0	2.5
Drowsiness	10.8	11.6	12.5
Blurred vision	0	7.0	2.5
Dry mouth	21.6	23.3	7.5
Excessive fatigue	0	9.3	10.0
Headache	0	11.6	5.0

DISCUSSION

The dose of scopolamine hydrobromide may be reduced with no impairment of its protective capacity when benadryl is added. In the actual training flights the mixture containing only half the usual dose of scopolamine hydrobromide was better than the full dose. The total percent affected in actual flight was about the same in both groups. The nausea resulting among those taking benadryl-scopolamine mixture, however, did not seem to progress beyond the mild stage whereas with scopolamine hydrobromide alone a significant percent continued to the severely nauseated stage. The side effects were slight with the reduced dose. Apart from an increased incidence of dry mouth, there was no greater incidence of any symptom than in the group receiving a placebo.

SUMMARY

A mixture of 0.33 mg. of scopolamine hydrobromide and 25 mg. of benadryl was compared with 0.65 mg. of scopolamine hydrobromide alone in the prevention of airsickness. No significant difference could be detected between the two groups when tested in the airplane using simulated turbulence for 1 hour. When actual navigator training flights were used for testing, the benadryl-scopolamine mixture gave greater protection against severe nausea and vomiting than did scopolamine hydrobromide alone. Among those who had been airsick at some previous time, the incidence of severe nausea and vomiting was: none with benadryl-scopolamine mixture; 9 percent with scopolamine hydrobromide alone; and 20.6 percent with the placebo. The incidence of drowsiness was the same for all groups. Dry mouth was common in both the group receiving scopolamine hydrobromide and in the group receiving the benadryl-scopolamine mixture. The occurrence of blurred vision, nervousness, excessive fatigue, and headaches was lower in the group receiving the mixture than in the group receiving scopolamine hydrobromide alone.

Surgical Correction of Mandibular Prognathism

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RAYMOND F. HUEBSCH, *Commander, DC, U. S. N.*[1]

MANDIBULAR prognathism has been defined as "abnormal protrusion of the lower jaw." Some of the causes of this condition are heredity, supernumerary teeth, abnormalities of the tongue, early loss of deciduous teeth, and late eruption of permanent teeth. Other general causes are rickets, syphilis, and diseases of childhood. In pronounced cases there is an inability to masticate food, and in many cases there is emotional instability from awareness of the deformity. Surgical interference would not be required if patients were seen early and treated by the orthodontist. Orthodontic treatment is most successful during adolescence and completion of the second stage of dentition. This treatment should be instituted as soon as the first sign of overdevelopment is detected. After puberty, untreated cases become more pronounced and surgical correction is usually necessary.

There have been many successful operations performed for mandibular prognathism. Hullihen performed an intraoral operation for this deformity in 1848. Intraorally a V-shaped piece was cut two-thirds through to the jaw from above, the distal fragment was cut free, or partially free, horizontally and displaced backward. In 1897 Angle recommended operation, and Blair performed a resection between the first molar and second bicuspid on one side, and a similar resection on the other side extraorally. In 1912 Harsha [2] described a method of performing a bilateral resection of the mandible posterior to the second molars for correction of prognathism. In his operation he preserved the mandibular nerve and removed a rhomboid section with the greater width of the bone segment above. He wired the cut ends of the mandible together and obtained an excellent

[1] Departments of Plastic and Oral Surgery, U. S. Naval Hospital, Oakland, Calif.

[2] HARSHA, W. M.: Bilateral resection of jaw for prognathism; report of case. Surg., Gynec. & Obst. 15: 51–53, 1912.

result. New and Erich [3] in 1941 described a method consisting of bilateral resection of a segment of the body of the mandible for mandibular prognathism. In this procedure, the segment of bone on either side is removed without injury to the mandibular nerve and vessels. Dingman [4] in 1944 described a two-stage procedure for correction of mandibular prognathism. His operation was successful and in 1948 he presented a review of his technic.[5] His operation is a modification of the methods introduced by Harsha and by New and Erich.

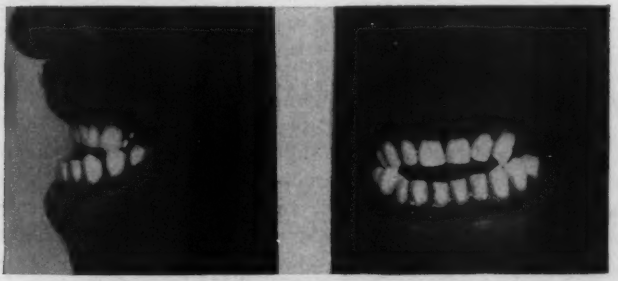

Figure 1.—Preoperative views showing extreme developmental mandibular prognathism. Patient lacked ability to masticate food.

Many other methods have been advocated, each of which corrects the deformity and repositions the teeth by either osteotomy or ostectomy. To reposition the teeth by osteotomy the ramus of the mandible is cut and the body of the bone moved to correct the deformity. Section may be performed by cutting across the ramus of the mandible between the mandibular sulcus and the angle of the mandible or by cutting through the necks of the condyles. The bone is held in position during healing by intermaxillary wiring. This method has been successful in many cases because it avoids injury to the inferior dental nerve and can be performed without contamination from the oral cavity. The chief disadvantages of this method are lack of control of the mandibular fragments and the possibility of injury to the facial nerve.

Ostectomy, removal of a previously measured segment of bone from the body of the mandible, has been described by many leading surgeons. The bone segment is removed without injury to the alveolar

[3] NEW, G. B., and ERICH, J. B.: Surgical correction of mandibular prognathism. Am. J. Surg. 53: 2–12, July 1941.

[4] DINGMAN, R. O.: Surgical correction of mandibular prognathism; improved method. Am. J. Orthodontics (Oral Surg. Sect.) 30: 683–692, Nov. 1944.

[5] DINGMAN, R. O.: Surgical correction of developmental deformities of mandible. Plast. & Reconstruct. Surg. 3: 124–146, Mar. 1948.

nerve and the operation is performed in two stages: intraoral and extraoral.

In the case described here, the treatment was according to the method of Dingman and presented little or no technical difficulty. The malocclusion was satisfactorily improved, giving a good functional and cosmetic result. The mandibular nerve and vessels were preserved. Figure 1 shows the preoperative appearance of the patient.

SURGICAL TECHNIC

Plaster study models were made of the dental structures and accurately mounted in an articulator (fig. 2). Cuts were made in the model to determine the exact size of the segments of the body of the mandible to be resected, in order to obtain normal occlusion of the teeth (figs. 3, 4, and 5). Teeth in the line of the cuts were to be extracted. Templates of sheet metal were cut to correspond to the

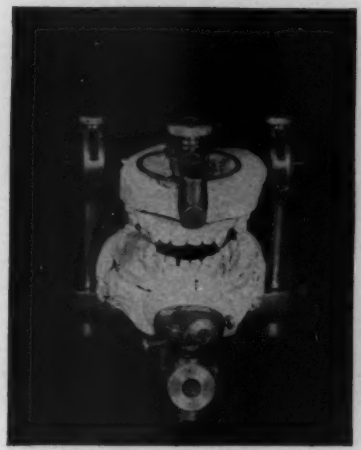

Figure 2.—Anterior view of plaster model illustrating degree of prognathism.

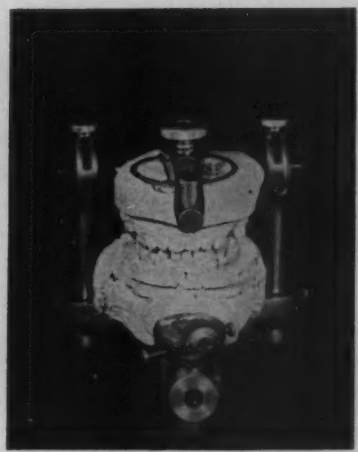

Figure 3.—Anterior view. The necessary cuts have been made in the model to reposition teeth.

size of the segments of bone to be resected. These metal plates were used for measurement during the operation.

Intraoral technic (first stage).—The patient was prepared for operation. Either inferior alveolar nerve blocks or intranasal intratracheal anesthesia can be used. In our case local anesthesia was used. A molar tooth in the line of cut was removed. An incision was made on the crest of the alveolar ridge in the long axis down to the bone. The mucoperiosteum was elevated on both sides of the

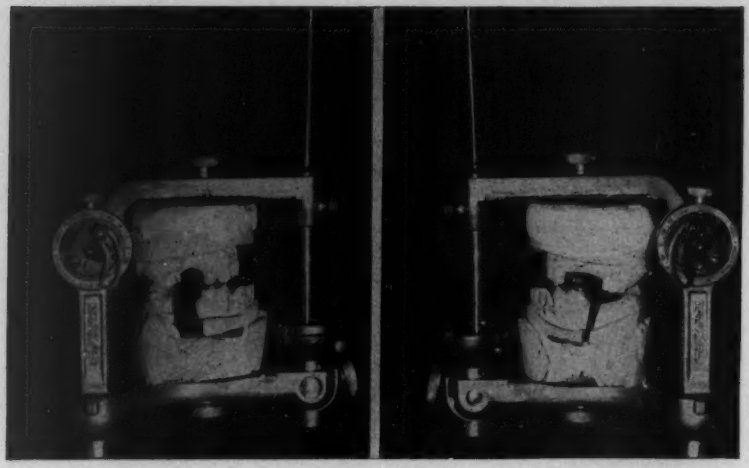

Figure 4.—Plaster model with segments removed from right and left sides of mandible illustrating the size of bone cuts necessary to reposition the teeth. Ostectomy was performed in two stages, intraoral and extraoral, leaving the mandibular nerves and vessels intact.

mandible, exposing the buccal and lingual plates of bone down to the level of the mandibular canal. The corresponding metal templates were placed on the bone and the segment of bone to be removed was outlined with an indelible pencil. The cuts were made on the buccal and lingual surfaces of the mandible down to the inferior

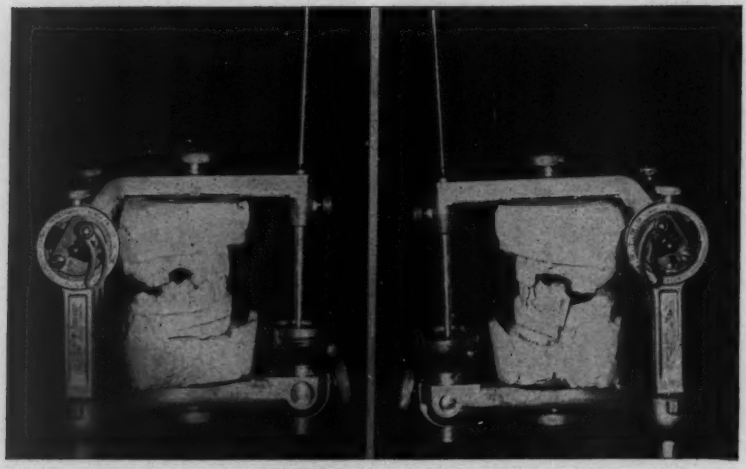

Figure 5.—Plaster models showing the malocclusion corrected. Mandibular segments have been removed bilaterally and teeth repositioned.

alveolar nerve with a surgical bur mounted in a contra-angle handpiece. The bone segment was likewise removed with the bur which facilitated accurate cutting of the segments. The wound was closed by suturing the mucoperiosteal flaps to cover the defect. The opposite side of the mandible was cut in a similar manner (fig. 6). The patient was given penicillin during the period of healing.

Extraoral technic (second stage).—The intraoral wounds healed in about 2 weeks and during this period intraoral splints were constructed and firmly secured to the upper and lower teeth. These splints were used for intermaxillary wiring following the second stage operation. After all signs of inflammation subsided at the

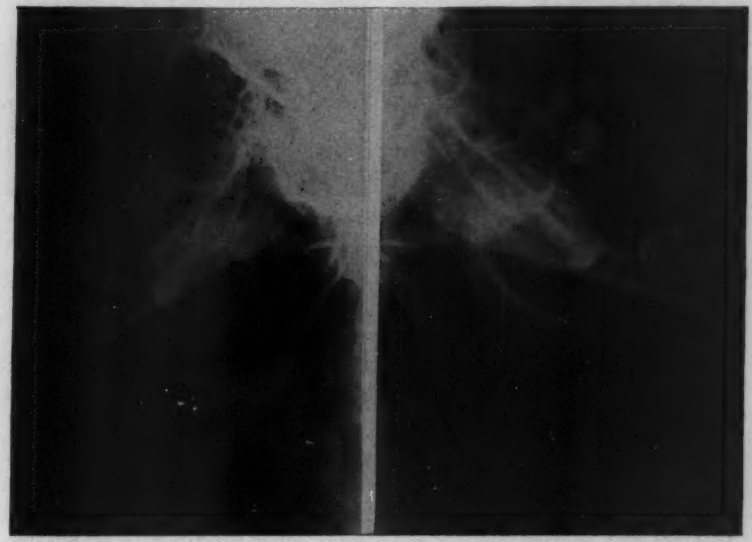

Figure 6.—Roentgenograms of mandible showing intraoral ostectomy (first stage of operation).

operative areas, the patient was prepared for operation and the extraoral procedure was carried out under intranasal, intratracheal anesthesia. An incision, about 2 inches long, was made at the lower border of the mandible at the site of the segment to be removed. The periosteum was elevated over the operative area and the previously made bone cuts were exposed. With a contra-angle dental handpiece and surgical bur, the cuts were extended over the lower half of the mandible. The segments of bone between the cuts were removed and the inferior alveolar nerve and vessels were exposed. Care was taken not to damage the nerve and vessels. The same procedure was repeated on the opposite side of the mandible.

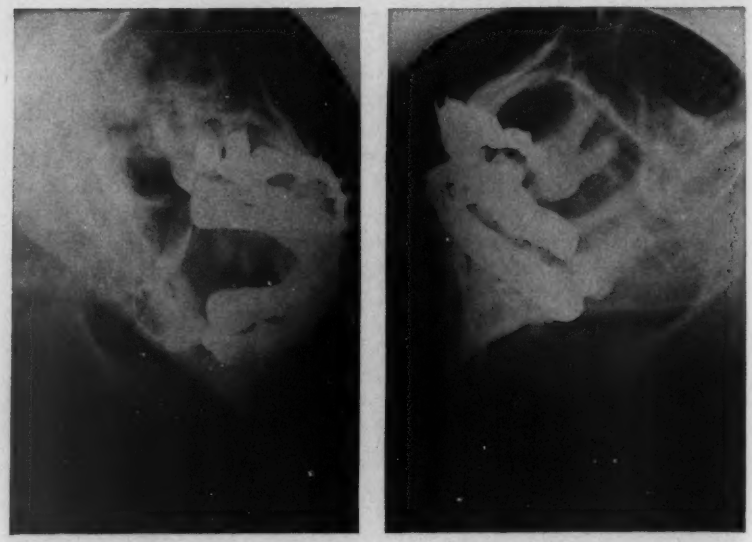

Figure 7.—Postoperative views following second stage of operation. The teeth have been repositioned and mandibular fragments have been secured by interosseous and intermaxillary wiring.

An assistant outside of the operative field then brought the teeth into occlusion and the removed segments of bone were checked for accuracy. The occlusion was satisfactory, so the cut ends of the mandible were held in position by interosseous wiring. The teeth were held in position by intermaxillary wiring (fig. 7). The periosteum was sutured to cover the bone cuts and the external wounds were closed in anatomic layers. Pressure dressings were applied to the mandible to prevent soft tissue swelling. The patient was given penicillin and feeding was carried out as in patients with intermaxillary wiring. The mandible was immobilized for 2 months, after which a recheck

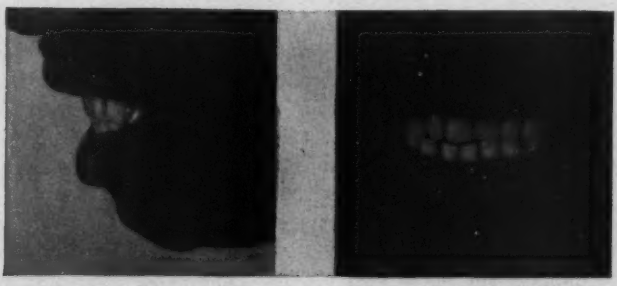

Figure 8.—Postoperative views showing prognathism corrected and teeth in occlusion.

of the roentgenograms revealed the cut ends of the fragments to be well united and the appliances were removed (fig. 8).

SUMMARY

In the case presented, the prognathism was developmental and caused the patient embarrassment and difficulty in eating. Incising and masticating of food was impossible because of the degree of prognathism and the lack of occlusion of posterior teeth caused by the loss of numerous bicuspid and molar teeth. The method of ostectomy was selected as the most feasible and as involving the least risk. The inferior alveolar nerves and vessels were exposed and paresthesia existed for 2 months, after which normal sensation returned to the lower lips and soft structures.

An Improved Duplication Procedure for Dentures

FRANCIS W. SHAFFER, *Major, DC, U. S. A.*[1]

THE following duplication technic was instituted at this laboratory early in 1948 in an attempt to improve the partial denture service for our stations. The results were gratifying and worth the additional effort in reproducing accurate stone duplications on which to fabricate partial dentures. When models for partial dentures are received from a station they are accurately surveyed for retentive zones for clasps and undesirable interproximal areas are eliminated by means of undercut wax. A good combination is one stick of hard inlay wax and two sheets of baseplate wax melted together. The surveyed models are then sent to the duplication bench for further processing. All areas which are not directly involved in the denture, such as peripheral rolls beyond saddle zones, labial peripheries which are excessively undercut, or any other imperfections which may interfere with the withdrawal of the master model from the agar (hydrocolloid), are eliminated by blocking out with plasticine or modeling clay.

Because agar materials will adhere tenaciously to gypsum products and all dental models contain gypsum, the models should be immersed in water for 20 minutes. This will facilitate the removal of the model from the agar. At the same time excess air in the model will have dispersed itself and will not appear in the hydrocolloid impression. The temperature of the water for immersion should be 125° F. in order not to melt the undercut wax and to warm the model so the agar material does not "freeze" while pouring on a cold model. When model stone or gypsum materials are immersed in water, instead of expanding as one would expect, they contract. Although definite shrinkage will occur in longer periods, the shrinkage in 20 minutes is less than 0.01 percent. This is negligible when all other factors affecting dental materials are considered. When the agar has been melted and tempered to from 125° to 130° F. the warmed

[1] Fifth Army Central Dental Laboratory, St. Louis, Mo.

model is placed in the duplication flask and the hydrocolloid is poured slowly over the model, completely filling the flask.

In order to obtain uniform results all procedures are timed by means of an interval timer. The filled flask is air-cooled for 5 minutes; half submerged for 5 minutes in water at 70° F.; then completely submerged for 10 minutes (or until gelation has occurred). The master model can be removed from the flask and a model stone can be poured into the impression and allowed to solidify for 45 minutes. At this time the agar can be peeled off the model and used over again.

With this procedure we are able to save additional time for the dental operator because we have a duplicate of the master model in case of breakage in handling. Models that are received and broken through mailing can sometimes be pieced together and duplicated by this procedure. Because we fabricate the partial denture on the duplicate model we are able to try the finished denture on the master model. Thus we are able to check the accuracy of the clasps and denture, realizing that if the denture fits the master model and not the mouth, the original impression or model was inaccurate. By carefully surveying and designing partial dentures and eliminating undesirable undercuts, and using a duplicate model with these undesirable factors eliminated, the finished dentures should fit the patient's jaw without unnecessary trimming and time-consuming adjustments on the part of the dental officer.

Bronchogenic Carcinoma

A Study of 100 Microscopically Proved Cases

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WITHIN the past few years great strides have been made in the surgical treatment of bronchogenic carcinoma.[2-4] On the other hand, the treatment of this disease still is not so successful as it has been represented. In the large thoracic surgical centers, with a substantial percent of referred patients, considerable selection of cases is unavoidable. Those undiagnosed ante mortem and many of the obviously inoperable patients do not reach these institutions.

We have studied 100 unselected, consecutive histories of patients with microscopically proved bronchogenic carcinoma admitted to a general hospital in the past 3 years. All of our patients were men, as might be expected in a hospital of this type. Seventy percent were in the sixth decade of life (fig. 1). This finding emphasizes the importance of complete investigation of seemingly trivial pulmonary symptoms in patients of this age. In 93 percent of the patients in our series, on whom an admission photofluoroscopic examination was made, an abnormality was noted which demanded further investigation. These findings suggest the possibility of using mass photofluoroscopic examination of the male population in this age group as a means of detecting early, asymptomatic lesions. A breakdown of our material in terms of occupation, use of tobacco, and exposure to respiratory irritants was attempted, but no statistically significant data were obtained.

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[2] OCHSNER, A.; DEBAKEY, M.; and DIXON, J. L.: Primary cancer of lung. J. A. M. A. 135: 321–327, Oct. 11, 1947.

[3] CHURCHILL, E. D.: Primary carcinoma of lung. J. A. M. A. 137: 455–461, May 29, 1948.

[4] RIENHOFF, W. F., JR.: Clinical analysis and follow-up study of 502 cases of carcinoma of lung. Dis. Chest 17: 33–54, 1950.

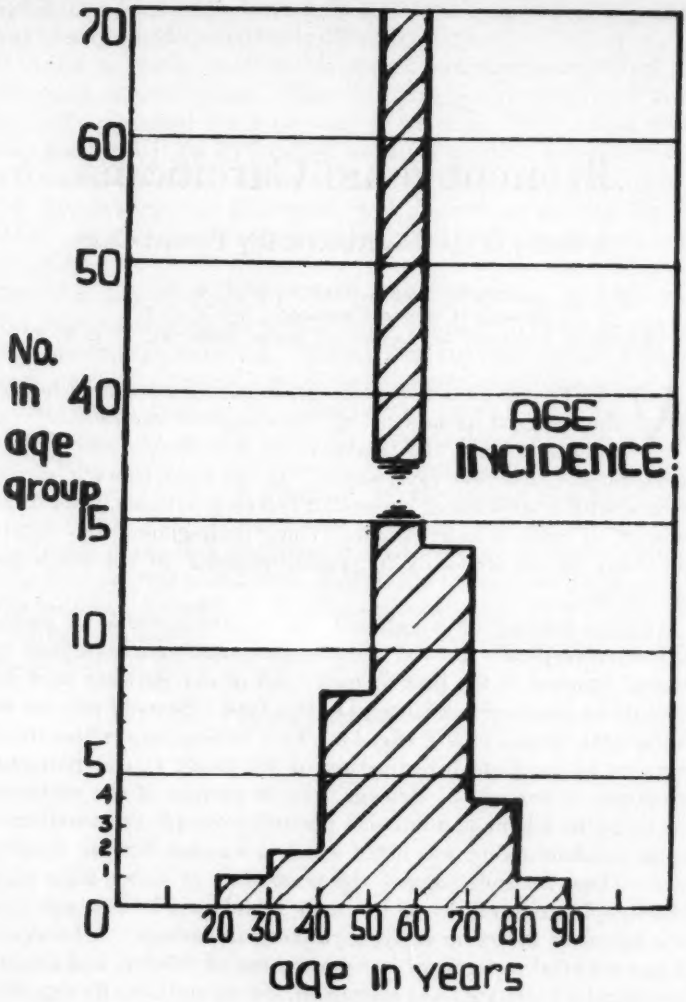

Figure 1.

PATHOLOGY

The locations of the primary lesions are shown in figure 2. Fifty-seven percent of the tumors were in the upper lobes, where bronchoscopic visualization and obtaining a specimen for biopsy are most difficult. Classified as to the microscopic findings, the tumors may be divided into three groups. There were 54 percent squamous cell carcinomas, 32 percent small cell or undifferentiated carcinomas, and

14 percent adenocarcinomas. Little correlation between cell type and prognosis could be established in this small series. Forty-six cases were examined at autopsy, and metastases were present in all. The sites of metastases are tabulated in table 1. The incidence of metastasis to the adrenal glands was high.

TABLE 1.—*Incidence of metastases in 46 autopies*

Location	*Number*
Mediastinum	27
Lymph nodes, other than mediastinal	20
Adrenal	16
Various abdominal viscera	12
Kidney	11
Heart and vessels	10
Bone	7
Pancreas	5
Pericardium	6
Esophagus	4
Brain	4
Mesentery	4
Opposite lung	3
Skin	3
Diaphragm and pleura	2

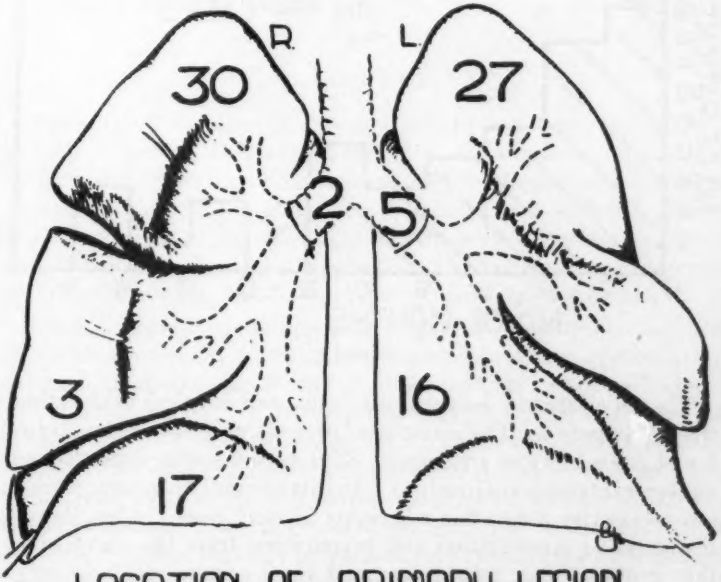

Figure 2.

CLINICAL FEATURES

Presenting symptoms in our series varied greatly, and were far from diagnostic in the early stages. Cough, chest pain, blood-streaked sputum, and weight loss were the most common. A change in the character of a preexisting cough, and repeated or prolonged episodes of pneumonitis, which respond temporarily to antibiotics, are to be regarded with particular suspicion. Positive physical findings were minimal, except in far-advanced cases. The delay between the initial symptoms and admission to the hospital is represented in figure 3. Although the majority of patients were admitted within the first 4 months, a substantial number were admitted 10 months or more after the onset of symptoms. The prognosis was poorest in these, and this emphasizes the need for further education of both the public and the medical profession.

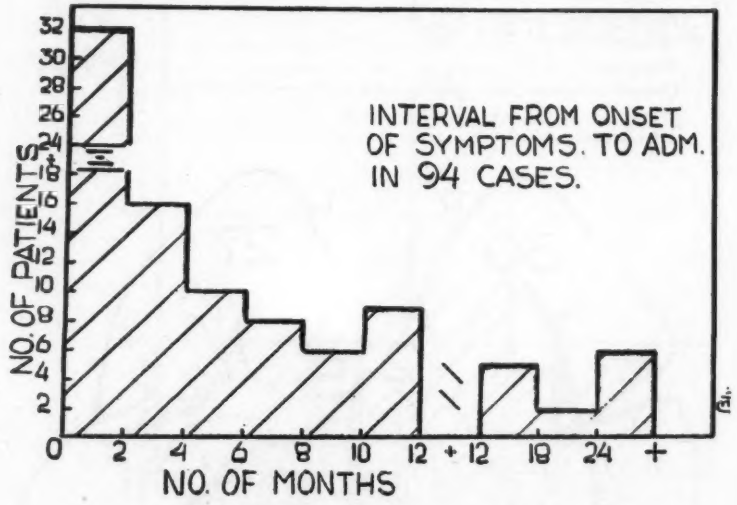

Figure 3.

The time interval between admission and surgical exploration is shown in figure 4. The majority of patients were operated on between 3 and 5 weeks after admission. This period seems somewhat long, but several factors are involved. In this hospital diagnostic work-ups are necessarily done after admission in most cases. Also, thorough preoperative investigation and preparation from the standpoint of the cardiovascular, respiratory, and renal systems are necessary in this age group. There seems to be little excuse, however, for the delays of 10, 12, or 16 weeks, which occurred all too frequently.

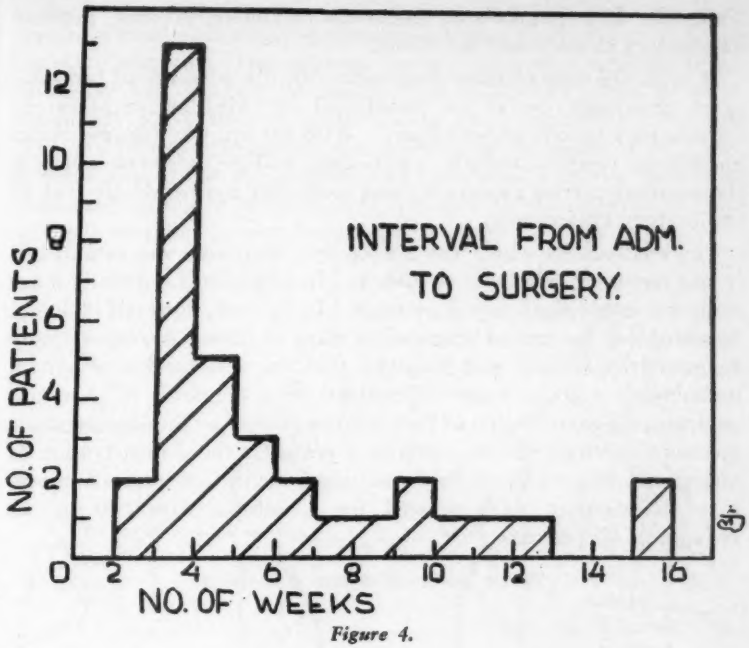

Figure 4.

DIAGNOSIS

The admission diagnosis was unrelated to pulmonary disease in 24 percent of cases. This emphasizes again the vagueness of the early symptoms in bronchogenic carcinoma and the importance of routine photofluoroscopic examination on admission to the hospital. Roentgen examination of the chest is by far the most important diagnostic tool at our disposal. In all patients of the present series, abnormal shadows demanding further study were present at some time.

Bronchoscopic examination and biopsy are important diagnostic procedures, especially for the microscopic confirmation of clinical and roentgen diagnoses. In 37 percent of our patients a positive diagnosis was thus established. In patients with more peripheral lesions, beyond the reach of the bronchoscope, indirect evidence may still be obtained by the microscopic examination of aspirated secretions, the finding of a distorted or fixed carina, or the presence of pus or blood in a bronchial lumen. Bronchograms occasionally may be helpful in finding an early lesion beyond the reach of the bronchoscope, and without clear-cut findings on routine chest roentgenograms.

In patients with suspected or proved bronchogenic carcinoma, biopsy of enlarged supraclavicular or axillary lymph nodes should be

obtained. If a diagnosis of metastatic carcinoma is made, needless exploratory thoracotomy is avoided.

If, with the help of these diagnostic aids, the presence of bronchogenic carcinoma cannot be established or ruled out, exploratory thoracotomy should be performed. With present-day refinements in anesthesia, surgical technic, antibiotics, and replacement therapy, thoracotomy carries a mortality and morbidity comparable to that of exploratory laparotomy.

The methods by which the microscopic diagnosis was established in our series are tabulated in table 2. In 29 patients a definite diagnosis was established only at autopsy. In fairness, however, it should be stated that the correct diagnosis in many of these cases was strongly suggested by clinical and roentgen findings ante mortem. Lymph node biopsy was the means of establishing a diagnosis in 14 of our patients; the examination of bronchial secretions by the Papanicolaou method confirmed the diagnosis in 2 patients; the demonstration of malignant cells in pleural fluid was diagnostic in 1 patient. Exploratory thoracotomy was required for a definite diagnosis in the remaining 17 patients.

TABLE 2.—*Establishment of diagnosis*

Method	*Number*
Bronchoscopic biopsy	37
Autopsy	29
Thoracotomy	17
Node biopsy	14
Bronchoscopic Papanicolaou stain	2
Pleural fluid cells	1
Total	100

TREATMENT

Twenty-six of the one hundred cases under study were never seen by the surgical department, either because they were considered inoperable by the medical department, or because the diagnosis was not considered prior to postmortem examination. Two patients were considered operable but refused operation and another left the hospital against advice before studies could be completed. Of the remaining 71 patients, 37 were adjudged inoperable at the time of surgical consultation. The reasons for refusing to perform an exploratory operation on patients with suspected or proved bronchogenic carcinoma were the demonstration of distant metastases in 12, massive extension to the chest wall in 7, recurrent nerve paralysis in 4, and a general physical condition incompatible with a major operation in 10. Bronchoscopic demonstration of endobronchial extension of the tumor to the carina also was considered a contraindication to operation in 4 patients.

Surgical exploration was performed on 34 patients, and in 15 invasion of vital mediastinal structures by tumor precluded palliative or curative resection. One patient died on the operating table before the chest was opened. At autopsy the lesion was found to be inoperable. Resection was performed on the remaining 18 patients. The procedures carried out are represented in figure 5. Limited involvement of the pericardium and chest wall were not considered contraindications to resection, and the involved tissues were included in the dissection, but with little hope for cure.

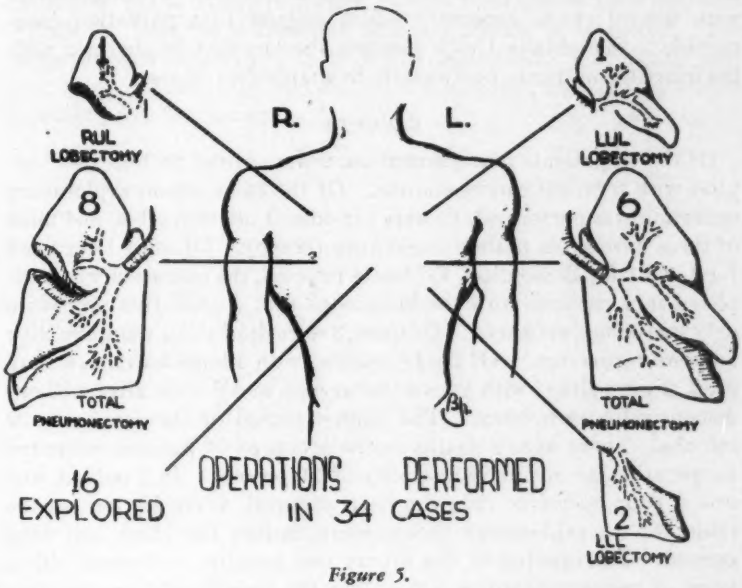

Figure 5.

Pneumonectomy, as the procedure of choice in the treatment of bronchogenic carcinoma, was performed in 14 of the 18 resected cases. Lobectomy was performed on 4 patients for "coin" type peripheral lesions with no gross evidence of extension to hilar or mediastinal nodes. In 2 instances in which the diagnosis had not been established until after resection, it was decided at the operation that the criteria for adequate cancer surgery had been fulfilled by the lobectomy. In the remaining 2 patients, lobectomy was a planned procedure; 1 had an extremely low preoperative vital capacity, and the other had just recovered from a spontaneous pneumothorax on the opposite side.

Fourteen inoperable or nonresectable patients received palliative roentgen therapy, with considerable temporary benefit in most in-

stances. One outstanding result was obtained. This patient, who had a nonresectable adenocarcinoma of the right upper lobe, received 10,800 roentgens over a 5-week period, and was active and gaining weight 17 months later. Recent follow-up films show that the tumor shadow has disappeared and that the atelectasis of the upper lobe has completely cleared. Interestingly enough, this patient was apparently cured of a squamous cell carcinoma of the tonsil by roentgen therapy several years previously. Five patients, inoperable or nonresectable, received a course of nitrogen mustard in addition to roentgen therapy, but only one was benefited. This is in disagreement with several recent reports[5,6] which suggest that palliation comparable to that obtained with roentgen therapy may be obtained with the nitrogen mustards, particularly in anaplastic tumors.

RESULTS

Of the 66 patients not operated on, 2 were alive,[7] both in this hospital with terminal carcinomatosis. Of the 34 on whom exploratory operation was performed, 15 were considered nonresectable, and most of these were given palliative roentgen therapy. Of these 1 survived for 4 and 1 for 17 months. Of the 18 resected, the operation was completed in 4 patients with the knowledge that a palliative procedure only was being performed. Of these, 3 were dead and 1 was alive with a known recurrence.[7] Of the 14 resected with a hope for cure, 4 were dead, 2 were alive[7] with known recurrence, and 8 were alive without demonstrable recurrence.[7] The longest period of survival[7] was 22 months. There were 2 deaths in the group of 34 patients subjected to operation, an operative mortality of 5.9 percent. In 1 patient who was a poor operative risk, the heart stopped, while he was on the table for an exploratory thoracotomy, before the chest had been opened. The opening of the thorax was rapidly performed with a hope of restoring cardiac action, but the hemithorax was so completely filled with adherent carcinomatous tissue and "drowned lung" that the heart could not be exposed satisfactorily for immediate massage. The other death occurred suddenly on the eighth postoperative day, apparently as the result of myocardial infarction. Permission for autopsy was refused. The operative mortality for the 18 resected cases was 5.6 percent.

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[5] KENT, L., and REH, E. P.: Treatment of bronchogenic carcinoma with nitrogen mustard. Dis. Chest 17: 190, 1950.

[6] RHOADS, C. P.: Recent advances in treatment of cancer. J. A. M. A. 136: 305–308, Jan. 31, 1948.

[7] As of 4 August 1950.

SUMMARY

Of 100 consecutive cases of microscopically proved bronchogenic carcinoma 70 percent occurred in patients between 50 and 60 years of age. All patients were men. Frequent mass photofluoroscopic examination of men of this age group is suggested as a means of detecting early silent lesions. The long interval between the onset of symptoms and admission to the hospital in many cases emphasizes the necessity for further educating both the public and the physician to the importance of complete and early investigation of pulmonary symptoms in the older age groups. Delay in diagnosis and treatment within the hospital is apparent, and this should be corrected. The importance of exploratory thoracotomy is stressed. Thirty-four percent were operable; 18 percent were resectable; and the operative mortality was 5.9 percent.

Carcinoma in Situ of the Cervix Uteri

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CARCINOMA in situ of the cervix has been described by various authors as noninvasive potential carcinoma of the cervix, Bowen's disease of the cervix, incipient carcinoma of the cervix, preinvasive carcinoma of the cervix, superficial noninvasive carcinoma of the cervix, and intraepithelial carcinoma of the cervix. That this entity has been described so variously is a reflection of the hesitancy to accept as carcinoma a condition which does not show invasion, heretofore a requisite condition for the diagnosis of any cancer. Carcinoma in situ of the cervix is, however, to be regarded as a form of carcinoma. Its occurrence is significant and presents several problems, some of which are illustrated by the case reported.

CASE REPORT

A 43-year-old, white, married para 6, gravida 6 housewife was admitted to the gynecology service of this hospital on 8 April 1947. She had been seen first in the orthopedic clinic with a chief complaint of backache of 4 years' duration. Examination was negative and she was seen in consultation because of a history of possible puerperal infection in 1938. On repeated questioning by several examiners, she recalled infrequent episodes of postcoital bleeding during the previous 12 or 15 years. Menses were regular and normal. The pregnancies had been normal and uncomplicated. Venereal disease was denied. The past history and review of systems was negative. The family history was pertinent in that both the mother and father of the patient had died of cancer. General physical examination was negative. Routine urinalysis, complete blood count, and serology were negative.

On 10 April, pelvic examination under anesthesia revealed only an enlarged, chronically infected cervix with erosion, ectropion, and bleeding on manipulation. Curettage of the uterus obtained normal luteal phase endometrium. Specimens of the cervix at 4 and 11 o'clock

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were taken for biopsy. The pathologist reported chronic cervicitis and healing erosion with squamous epidermidization of the glandular structures. Suspicion was aroused by certain areas of the basement layer of the epidermal covering appearing irregular and broken up by the chronic inflammatory reaction. Because of these findings trachelectomy, removing the proximal 3.5 cm. of the cervix, was performed on 19 April. Following examination at various levels the pathologist reported chronic cervicitis and healing erosion.

The cervical stump healed uneventfully and the patient was free of all symptoms other than those relative to functional backache.

Figure 1.—Low-power photomicrograph. Note the modification of the normal squamous epithelial architecture with tendency toward basilar hyperactivity and atypical cells in the superficial layer. Anaplasia is more distinct in the epithelium at the right.

Repeated vaginal smears were negative. In January 1949, nodular induration of the cervical stump and bleeding on manipulation were noted. Further observation was advised in view of the negative smears and absence of symptoms. I first saw the patient in September. Examination at this time revealed persistent, irregular consistency of the cervical stump with bleeding on manipulation, and palpable thickening at the base of both broad ligaments which had not been noticed previously. Because of these findings, the sections from the biopsy and amputation of the cervix were reviewed and the blocks recut. Representative sections are shown in figures 1 to 6. Several consulting pathologists agreed that carcinoma in situ of the cervix was present, and the possibility of invasive carcinoma was

Figure 2.—Low-power photomicrograph. Note the changes in the squamous epithelium with loss of stratification and cellular atypicalism.

Figure 3.—High-power photomicrograph of the squamous epithelium in figure 2. Note the abnormal cells with hyperchromatism, loss of polarity, increase and variation in size and shape of nuclei, and mitotic figures.

Figure 4.—Low-power photomicrograph. Note the loss of normal stratification and cellular changes involving all layers. Squamous metaplasia is noted in the upper right corner.

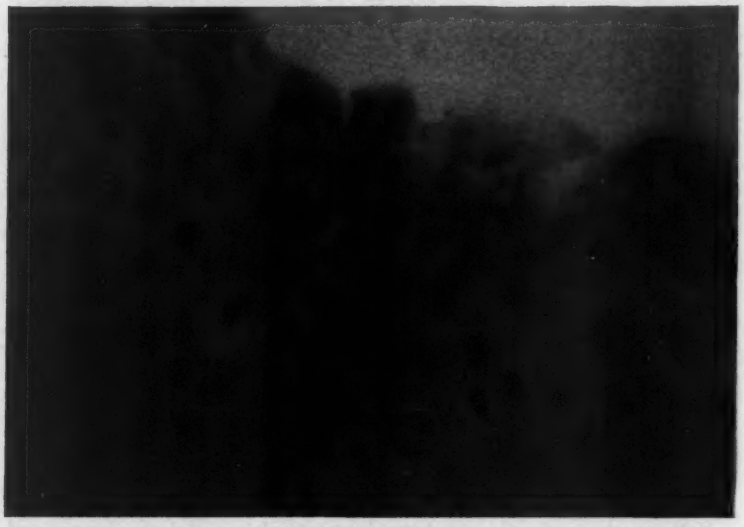

Figure 5.—High-power photomicrograph of an area from figure 4. Note the variation in size, shape, and staining reaction of the various cells. The cell with the large, horseshoe-shaped nucleus in the center is representative of the type of cell present in positive cytologic smears from invasive carcinoma of the cervix.

suggested. The clinical findings suggested recurrence of the primary carcinoma and indicated the need for further investigation.

An exploratory laparotomy was performed 18 October. No abnormalities of the abdominal viscera were noted. The pelvic viscera were normal except for a rubbery thickening at the base of both broad ligaments. There were no palpable masses or lymph nodes in the iliac, hypogastric, obturator, pararectal, and preaortic areas. A radical panhysterosalpingo-oophorectomy was performed, removing en bloc all of the tissue lying medial to the two ureters and a generous vaginal cuff with its surrounding fascia. The procedure was well tolerated and the postoperative course was uneventful. Gross and micro-

Figure 6.—Low-power photomicrograph of a cervical gland replaced by squamous epithelium. The absence of normal stratification and the atypical cells, particularly near the basement membrane are considered significant. This would be variously diagnosed as squamous metaplasia, carcinoma in situ, and invasive carcinoma of a cervical gland.

scopic examination failed to reveal carcinoma. The parametrial tissues contained a dense fibrous connective tissue. The pathologist reported that sections of the cervical stump showed cervical stroma lined by fragments of stratified squamous epithelium. There were cystically dilated glands, scattered lymphocytes, and macrophages containing old blood pigment. Convalescence was uneventful and the patient resumed full activity. Examination at the time of the writing of this article was negative. Further follow-up examination was indicated.

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COMMENT

The significant feature of this case is the establishment of the diagnosis of carcinoma in situ 2 years and 5 months after the original treatment. This experience is not unusual,[2 3] but it emphasizes the importance of a careful and thorough investigation of all lesions of the cervix with serial or step sections of the specimen. With respect to the significance of carcinoma in situ of the cervix, many patients deserve reevaluation of their cervical lesions. It is the responsibility of the gynecologist to examine pathologic specimens completely in this manner and to follow the progress of these lesions subsequent to treatment with examination, repeated biopsy, and cytologic smear. Without doubt, the diagnosis of carcinoma in situ of the cervix has not been established in many instances when an inadequate pathologic and diagnostic study has been carried out and a diagnosis of benign disease made. The review of all cervical lesions will yield many more cases of carcinoma in situ of the cervix and obtain additional information that is needed to evaluate this disease.

Although the present result is good, amputation of the cervix is not to be regarded as adequate treatment. There are reports of recurrence following amputation. Galvin and TeLinde,[3] and Younge, Hertig, and Armstrong[4] recommend total hysterectomy. The presence or absence of involvement of the cervical glands is a focal point for differential treatment. TeLinde regards cervical gland involvement as invasion. His studies have repeatedly shown glandular involvement which would not be removed by amputation. Hertig regards involvement of the cervical glands as preinvasive, reasoning that the glands are epithelial structures in continuity with the surface epithelium and that the intact basement membrane is a barrier between epithelium and stroma. In the absence of glandular involvement, Younge, Hertig, and Armstrong recommend the use of cautery or conization with close follow-up of results using the Schiller test, cytologic smears, and repeated biopsy studies. In summarizing their 135 cases, they list amputation as adequate treatment in the absence of cervical gland involvement. They consider secondary irradiation after amputation adequate in the presence of gland involvement.

The occurrence of postcoital bleeding in the case presented here was not considered significant. Abnormal vaginal bleeding is the

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[2] KNIGHT, R. V.: Superficial noninvasive intraepithelial tumors of cervix. Am. J. Obst. & Gynec. 46: 333–349, Sept. 1943.

[3] GALVIN, G. A., and TELINDE, R. W.: Present-day status of noninvasive cervical carcinoma. Am. J. Obst. & Gynec. 57: 15–36, Jan. 1949.

[4] YOUNGE, P. A.; HERTIG, A. T.; and ARMSTRONG, D.: Study of 135 cases of carcinoma in situ of cervix at Free Hospital for Women. Am. J. Obst. & Gynec. 58: 867–985, Nov. 1949.

only prominent symptom noted in large series of cases. This is not diagnostic, for half of the patients are asymptomatic when the diagnosis is established.

The photomicrographs show a variety of epithelial changes. The finding of such a variety in the same specimen is not unusual. All grades listed by Hertig from basal hyperactivity to anaplasia and carcinoma in situ with and without cervical gland changes may be seen in serial sections of a cervix with carcinoma in situ. Significantly, similar changes were described in 1912 by Schottlaender and Kermauner [5] in their report of epithelial cytologic changes at the periphery of invasive carcinoma of the cervix. There are still persons of mature judgment who deny that carcinoma in situ is true carcinoma. This difference of interpretation depends on the absence of invasion, but does not consider the biologic evidence which is being accumulated. Acceptance of the significance of cytologic changes has been accelerated by the study of exfoliated cells in vaginal secretions [6] and the smear made with the cervical scraper of Ayre.[7]

DISCUSSION

The most recent review of the literature [4] lists 18 cases of untreated carcinoma in situ which have progressed to invasion. These reports by competent observers are to be highly regarded. These 18 cases are the result of error in the original diagnosis or refusal by the patient to accept adequate treatment. One case reported by Younge, Hertig, and Armstrong is particularly significant in that treatment was deliberately avoided. This decision was made only after another competent pathologist had disagreed with the diagnosis. The diagnosis was made on routine biopsy of a mildly eroded, but clinically benign cervix. Under observation, repeated biopsy studies showed persistent in situ carcinoma. Biopsy 11 months later suggested invasion and amputation was performed. Serial sections revealed invasive carcinoma at the site of the original carcinoma in situ. In this clinical experiment, carcinoma in situ developed into a frankly invasive, but symptomless, carcinoma in 11 months. With such evidence, it is difficult to deny that carcinoma in situ is true carcinoma, but at an early stage.

One of the first considerations in any discussion of carcinoma of the cervix is what are adequate numbers and types of biopsy specimens? Technics of obtaining specimens for biopsy and new instruments for

[5] SCHOTTLAENDER and KERMAUNER: Zur Kenntnis des Uteruskarzinoms. Verlag von S. Kargar., Berlin, 1912.

[6] PAPANICOLAOU, G. N., and TRAUT, H. F.: Diagnosis of Uterine Cancer by the Vaginal Smear. The Commonwealth Fund, New York, N. Y., 1943.

[7] AYRE, J. E.: Vaginal smear; precancer cell studies using modified technique. Am. J. Obst. & Gynec. 58: 1205–1219, Dec. 1949.

obtaining specimens of the cervix for biopsy are being tried out and their use reported. The adequacy of the specimens for biopsy is related to the fundamental problem in management of carcinoma of the cervix, i. e., the difficulty of determining the extent of the disease. The presence or absence of invasion is frequently not determined until amputation of the cervix or total hysterectomy is accomplished. If involvement of the cervical glands is accepted as invasion, step section of the entire cervix might be necessary in the management of these patients. Galvin and TeLinde found invasion of the cervical glands in 55 of their 75 patients and because of this they recommended total hysterectomy for all patients with carcinoma in situ. The burden of proof of lack of invasion rests with the gynecologist for the finding of an in situ lesion means (1) it was obtained from the periphery of an invasive carcinoma, (2) there is involvement of the cervical glands, or (3) there are changes in the surface epithelium only. This differentiation must be made.

The importance of repeated examination and repeated diagnostic procedures such as the Schiller test, biopsy, and the cytologic smear is evident. The evidence for the relationship of infection and trauma to carcinoma of the cervix is equivocal, the disease occurring in both benign and diseased cervixes. For follow-up, the cytologic smear is of great value. Younge, Hertig, and Armstrong obtained 93 percent positive smears when there was involvement of the cervical glands and 53 percent positive smears with involvement of the surface epithelium only.

In this clinic, three primary diagnoses of carcinoma in situ have been established in the past 6 months. All three of these patients were asymptomatic and the cervixes appeared clinically benign. The diagnoses would not have been established except that surprisingly positive smears led to further diagnostic investigation. The incidence of carcinoma in situ in cervixes which are clinically benign is reported as 1.2 percent.[4] This experience suggests that more widespread use of smears will increase the general incidence of carcinoma in situ of the cervix when combined with adequate biopsy technics.

If TeLinde's concept that involvement of the cervical glands represents invasion is correct, then the finding of 55 cases with invasion in 75 cases is significant. In their recent surgical experience, Morris and Meigs [8] report an 18 percent incidence of lymph node metastasis in clinical Stage I carcinoma of the cervix. Thus, the presence of lymphatic pelvic extension is not incredible in carcinoma in situ of the cervix. Their findings highlight the inadequacy of clinical staging and help to explain the 39 to 45 percent failure to cure Stage I car-

[8] MORRIS, J. M., and MEIGS, J. V.: Carcinoma of cervix; statistical evaluation of 1,938 cases and results of treatment. Surg., Gynec. & Obst. 90: 135–150, Feb. 1949.

cinoma with irradiation. The patients with carcinoma in situ treated by total hysterectomy have been operated on too recently to evaluate results in terms of cure rates.

Following such reasoning, the objection will be raised that total hysterectomy is inadequate for carcinoma in situ, and then the question will be how radical should the operation be? In his interesting study, Henriksen [9] reports a 20 percent error in the interpretation of the pathologic status of lymph nodes based on the gross appearance at operation and autopsy. In addition, preoperative irradiation may cause such a distinct tissue reaction that the surgeon is unable to differentiate between pure irradiation effect and malignant extension. Henriksen also reports that carcinoma of the cervix is not the localized disease it is commonly assumed to be. He found distant metastases in 27 percent of untreated and 53 percent of treated patients with carcinoma of the cervix.

Although irradiation would appear to be the treatment of choice for carcinoma in situ, a localized lesion, the morbidity and mortality rate following irradiation alone is not insignificant. The only death in Galvin and TeLinde's series followed irradiation. The radio sensitivity of carcinoma in situ has not been determined, and indeed we have no means of predicting the radio sensitivity of any carcinoma. As Morris and Meigs [8] concluded, irradiation is, at best, a blind procedure. The dosage delivered to the tumor cannot be determined accurately and the many variables in such therapy preclude determining the cancerocidal dose for individual tumors.

Our present knowledge of carcinoma of the cervix, including the in situ variety, is based on morphologic studies. There is an urgent need for the ability to determine the biologic potential of each individual carcinoma. It is safe to predict that the results of treatment will not improve greatly until the gynecologist is able to evaluate each tumor individually and treat it accordingly. The average patient is a fiction of statistical study and usually bears little resemblance to the individual patient that will obey the "all or none" principle in regard to cure.

Black, Bolker, and Kleiner [10] recently reviewed the present knowledge of the biology of malignancy. They point out the evidence for all forms of malignancy assuming behavior patterns and characteristics with a strong central tendency. Carcinoma of the cervix has a significant number of characteristics common to all varieties of malignancy. Local manifestations may vary, but there is a surpris-

[9] HENRIKSEN, E.: Lymphatic spread of carcinoma of cervix and of body of uterus; a study of 420 necropsies. Am. J. Obst. & Gynec. 58: 924–942, Nov. 1949.

[10] BLACK, M. M.; BOLKER, H.; and KLEINER, I. S.: Some considerations of morphology and metabolism in malignant neoplasia. New York State J. Med. 50: 309–315, Feb. 1, 1950.

ing uniformity of alterations of the body milieu. Biochemical studies of the tumor and studies of the body tissues and changes in the blood and urine of the tumor host show an appreciable uniformity of results. There is alteration of glycolysis and associated oxidation enzymes in the tumor. Liver metabolism and cytochemical activity are altered. There are changes in serum fluorescence and the reducing power, fibrinogen content, and heat coagulation of plasma. The excretion of specific and nonspecific steroids, and gonadotropic and splenotropic substances has been demonstrated.

Greene and Newton [11] reported significant findings in their study of uterine carcinoma in the rabbit. They found that there was a gradual transformation from neoplasia to malignancy with its abilities of invasion, extension, metastasis, and autonomy. This was strengthened by the demonstration of a definite relationship to the constitution of the host in this transformation to malignancy. Tumors capable of autologous transplantation must undergo additional transformation before they are capable of homologous transplantation. Black, Bolker, and Kleiner conclude, "Further work on cancer as a systemic disease in general and the tumor-host relationship specifically appears justified at this time."

These observations and conclusions are pertinent to the consideration of carcinoma in situ of the cervix. The average age incidence is about 10 years less than that of invasive carcinoma of the cervix, suggesting a dormant or latent period of neoplasia before malignant transformation occurs. Thus, carcinoma in situ is comparable to the tumor that can be transplanted autologously but not homologously. Such latency is not unlikely when consideration is given to the common instances of extensive invasive carcinoma of the cervix occurring with minimal symptoms of short duration. Further evidence is offered by the report of 12 years' delay before invasion in one case of untreated carcinoma in situ of the cervix.[3]

Most of the patients are in the 30- to 35-year-old age group. The fact that many of them are in the child-bearing age may be the most important practical factor in differential treatment. Younge has permitted some of his patients to become pregnant after conservative therapy. With close observation, no adverse consequences have been encountered in these carefully selected patients. To avoid the subjective and objective effects of castration, TeLinde [12] recommends preservation of ovarian function when total hysterectomy is performed.

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[11] GREENE, H. S. N., and NEWTON, B. L.: Evolution of cancer of uterine fundus in rabbit. Cancer 1: 82–99, May 1948.

[12] TELINDE, R. W.: Intraepithelial carcinoma (in situ) of cervix uteri. Surg., Gynec. & Obst. 88: 792–794, June 1949.

Conservative surgery should prove adequate in most instances. Investigation of the systemic body changes should yield further information in approaching satisfactory individualization of treatment, and should be accomplished in subsequent study of carcinoma in situ of the cervix. Refinement and simplification of these tests will aid not only in the diagnosis of the extent of the disease but will also serve as checks on the progress of therapy. If the results of treatment are to approach cure in every instance of carcinoma in situ of the cervix, such aids in estimating the systemic involvement will have to be developed and used. Reports of both success and failure after all methods of treatment are found in the literature. We must admit that our clinical ability to estimate the extent of carcinoma of the cervix in every case is inadequate. The extent of treatment must approach the extent of the disease for each patient to overcome the weakness of routine treatment of any type based purely on the morphology of the local lesion.

Many physicians selectively limit the use of the cytologic smear to patients 35 years of age or older, or to those in whom the gross appearance of the cervix suggests malignancy. The accumulating evidence indicates the error of this selection. A smear should be taken whenever there is any lesion of the cervix, regardless of gross appearance, symptoms, or the age of the patient. Whenever facilities are available, a specimen for biopsy should be taken routinely before cautery or more extensive treatment is given. Many adequate biopsy instruments are available and this procedure can be performed adequately and safely on the ambulatory patient.

It is only by the increased use of these diagnostic aids that a greater number of cases of carcinoma in situ of the cervix will be discovered. The diagnosis should be made, for here is an unequaled opportunity to treat a neoplastic growth of low grade malignancy before it is transformed to a cancer with a 40 to 45 percent failure rate in its most favorable stage. Unlike any other part of the body with a comparable incidence of malignancy, the cervix is easily accessible to adequate examination. Using present diagnostic aids, carcinoma in situ of the cervix should be detected and a high cure rate obtained. In time, additional aids to evaluate the extent of the disease, the biologic potentialities of the local growth and the constitution of the host will give ideal results for each patient, instead of the present prospect of a percentage result for the average patient.

SUMMARY

The real incidence of carcinoma in situ will become evident through more frequent use of the diagnostic aids and methods now available and the review of lesions of the cervix with serial or step sections of

the pathologic specimens. Treatment of these lesions offers a great opportunity to solve the problem of carcinoma of the cervix. More information concerning carcinoma of the cervix as a systemic disease and the tumor-host relationship is needed. Application of such information will be of value in determining the extent of the disease and the response to therapy. Satisfactory individualization of treatment for a significant increase in cure of carcinoma of the cervix will be possible only after such information is available and applicable to individual patients.

Amebiasis With Hepatic Abscess and Pleuropulmonary Involvement[1]

RYLE A. RADKE, *Colonel, MC, U. S. A.*

THIS article reports a case of a complication of intestinal amebiasis which is rarely encountered, having been found only once in 101 patients with intestinal amebiasis treated at this hospital. Others have recorded its occurrence in from 5 to 15 percent of cases.[2] Although Ochsner and DeBakey [3] found pleural or pulmonary involvement in 15.8 percent of a series collected from the literature and their personal experience, they point out that a lower incidence of liver abscess was recorded during the period 1938 to 1941. They attribute this to earlier diagnosis and more effective treatment of intestinal amebiasis. Liver involvement was found in 9.2 percent of 748 patients diagnosed as having intestinal amebiasis in the United States troops in India during World War II.[4] Of the 69 cases with liver involvement 26 percent had abnormal pulmonary findings, but only 1 had pleural effusion. The World War II data as well as our experience appear to confirm the downward trend in incidence of this complication noted by Ochsner and DeBakey.

As early as 1828 the frequent association of liver abscess and ulcerative dysentery was noted but the direct etiologic connection was not then appreciated. After Losch [5] in 1875 described the *Endamoeba* which he recovered from the stool of a Russian peasant and with which he fulfilled all of Koch's postulates except the culture in pure form, Kartulis [6] in 1886 was able to find *Endamoeba histolytica* in 19 of 20 patients with liver abscess. He recovered motile trophozoites from the abscess pus of one of these patients. In 1890 Osler [7] found

[1] U. S. Army Hospital, Fort Knox, Ky.

[2] HUGHES, F. A., JR., and WESTPHAL, K. F.: Amebiasis with pulmonary involvement. Arch. Surg. 55: 304–315, Sept. 1947.

[3] OCHSNER, A., and DEBAKEY, M.: Amebic hepatitis and hepatic abscess; analysis of 181 cases with review of literature. Surgery 13: 460, Mar. 1943; 612, Apr. 1943.

[4] KLATSKIN, G.: Amebiasis of liver; classification, diagnosis and treatment. Ann. Int. Med. 25: 601–631, Oct. 1946.

[5] LOSCH, F.: Massenhafte entiwickelung von amoben im dickdarm. Arch f. Path. Anat. 65: 196–211, Nov. 1875.

[6] KARTULIS: Ueber Tropische Leberabscesse. Arch f. Path. Anat. 105: 521, 1886.

[7] OSLER, W.: On amebae coli in dysentery and in dysenteric liver abscess. Bull. Johns Hopkins Hosp. 1: 53, May 1890.

amebas in the pus and stools of a patient with liver abscess but stated that their etiologic connection with the disease was questionable. Shortly thereafter Councilman and LaFleur [8] published their observations on a number of patients and reached the conclusion that the amebas were undoubtedly concerned with the production of the liver and lung disease associated with amebic dysentery. Since that time the causal relationship between the amebas and such complications of amebiasis as hepatic abscess and pulmonary disease has been accepted in America.

Ipecac as a remedy for dysentery was employed by the Peruvians and introduced in Europe by Piso. It was used successfully to treat Louis XIV and was widely employed thereafter. In 1912 its ether-soluble alkaloid, emetine, was shown by Vedder [9] to be useful in treating amebiasis and by Rogers [10] to be useful in treating the hepatic and pleuropulmonary complications. That it is not completely successful, is attested by the continuing search for new amebicidal drugs. In 1946 a patient with pleuropulmonary complication of intestinal amebiasis had been given two courses of 0.8 gram each of emetine intramuscularly within a month and still remained gravely ill. He was then given quinacrine with a successful therapeutic result. This stimulated further study of the effects of quinacrine in amebiasis.[11] As a result of these studies the case reported here was treated with quinacrine.

CASE REPORT

A 36-year-old gravely ill man was seen on 24 September 1949. He had been well and a chest roentgenogram was negative at the time he left his station in Germany on 8 September. On 12 September he developed a sharp, persistent pain over the lower portion of the right side of the chest associated with slight fever but no cough. The pain was not affected by respiration, but was made worse by movement of the body and was referred to the back in the right subscapular area. He lost his appetite for all except cold foods and his fever became more severe. On 22 September the back pain became continuous and severe. He had lost 50 pounds since 1942 when he began having short intermittent attacks of diarrhea while on duty in Panama.

Physical examination on admission revealed an acutely ill man with a temperature of 102.8° F. Lagging inspiration, dullness to per-

[8] COUNCILMAN, W. T., and LAFLEUR, H. A.: Amoebic dysentery. Johns Hopkins Hosp. Rep., Vol. 2, 395, Nos. 7, 8, and 9, 1891.

[9] VEDDER, E. B.: Origin and present status of emetine treatment of amebic dysentery. J. A. M. A. 62: Feb. 1914.

[10] ROGERS, L.: Rapid cure of amoebic dysentery and hepatitis by hypodermic injections of soluble salts of emetine. Brit. M. J. 1: 1424, June 1912.

[11] RADKE, R. A.: Treatment of amebiasis with atabrine combined with carbarsone. To be published.

cussion, and absence of breath sounds and tactile fremitus were noted on the right side. His liver was palpable 4 and his spleen 3 finger-breadths below the costal margin (fig. 1). His liver was tender. The leukocyte count was 15,800 with 77 percent neutrophils. There was a trace of albumin in the urine. The pleural fluid was straw-colored and contained 650 leukocytes per cu. mm. Smears and cultures of this fluid were negative. There was 10 percent bromsulfalein retention 45 minutes after giving the dye.

Figure 1.—Roentgenogram of abdomen at start of treatment showing hepatic and splenic enlargement.

On admission he was erroneously thought to have bacterial pulmonary involvement (figs. 2 and 3) and treatment with penicillin was instituted while bacterial cultures were being studied. He developed erythema multiforme and the penicillin was discontinued. On 3 October stool specimens were found to contain cysts of *E. histolytica.* On 4 October sigmoidoscopic examination revealed extensive ulcerations of the rectosigmoidal area. Aspirated specimens from these lesions contained trophozoites and cysts of *E. histolytica.* The patient was given 0.1 gram of quinacrine q. i. d. on 4 October and subsequently for 18 days. His temperature returned to normal within 36 hours after starting this treatment and his clinical condition improved. In the belief that the previous allergic reaction was caused by amebiasis, penicillin therapy was reinstituted. A severe angioneurotic edema developed and the drug was discontinued. The patient's temperature fluctuated between 98° and 99.6° F. The liver

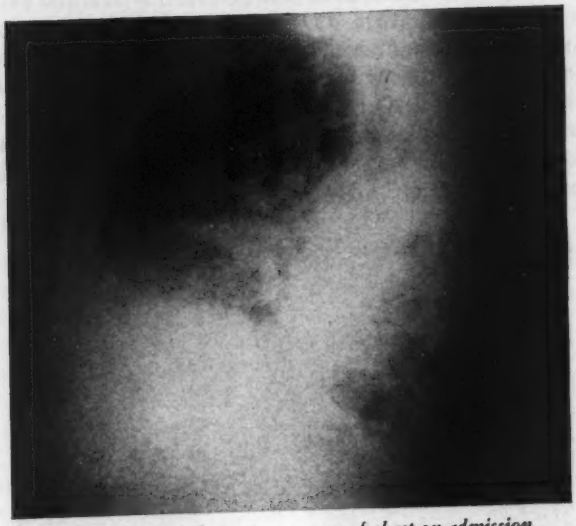

Figure 2.—Lateral roentgenogram of chest on admission.

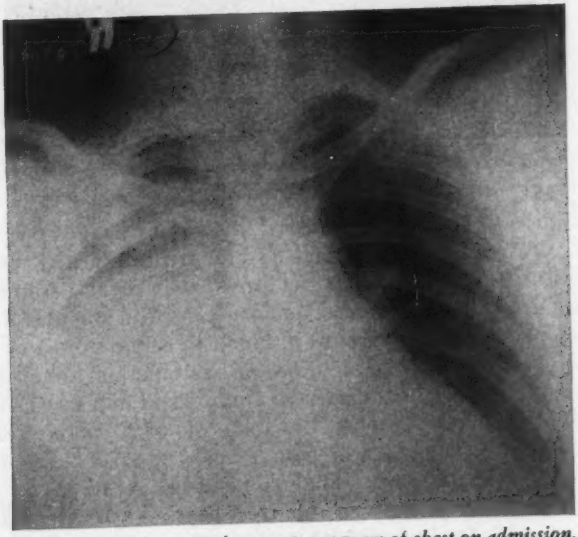

Figure 3.—Anteroposterior roentgenogram of chest on admission.

and spleen returned to normal size and the pleural condition improved. On 22 October quinacrine was stopped and 0.25 gram of carbarsone was given t. i. d. Sigmoidoscopic examination at this time revealed normal mucosa from which the smears were negative for *E. histolytica.* Within 2 days after stopping the quinacrine the patient's temperature began to fluctuate between 100° and 102° F., and there was extension of the pleural process. Carbarsone therapy was continued and on 27 October treatment with 0.5 gram of aureomycin every 4 hours was begun. An additional gram of aureomycin was given the next day. The patient's temperature remained elevated until treatment with quinacrine was restarted on 30 October.

On 1 November the temperature returned to normal for the first time since quinacrine had been discontinued. The treatment with carbarsone was continued until 2 November. The fluid within the pleural cavity had become loculated during this period and thoracentesis was performed on 1 November. A small amount of bloody fluid was obtained which was negative for pathogens by smear and culture. On 2 November the patient developed a cough and began to raise large amounts of yellow sputum which contained motile trophozoites of *E. histolytica.* This was interpreted as meaning that a bronchopleural fistula had developed. Cultures of this material were negative for *E. histolytica* and other pathogens. On postural drainage sputum production dropped from 200 cc. to less than 20 cc. a day in 4 days. On 15 November smears and cultures from three stools following a saline purge were negative for *E. histolytica.*

Chest roentgenograms revealed the continued presence of loculated fluid; consequently, on 22 November, 210 cc. of yellow-brown material was aspirated from the right pleural cavity. Direct smear of this material was negative for trophozoites and cysts of *E. histolytica* but streptococci were seen. Alpha streptococci were isolated by culture. On 28 November the right pleural cavity was again aspirated and 20 cc. of similar material removed. The right pleural cavity was irrigated with normal saline and 250 mg. of aureomycin in saline solution instilled into it. Smears and cultures of this specimen were negative for *E. histolytica.* Sigmoidoscopic examination on 29 November revealed normal mucosa and aspirated specimens were negative for *E. histolytica* by smear and culture. Medication with quinacrine was discontinued on 30 November. Roentgenograms of the chest showed the pleura to be greatly thickened (figs. 4 and 5). The liver and spleen returned to normal size (fig. 6). On 14 February 1950 there was no bromsulfalein retention, and sigmoidoscopic examination revealed a normal mucosa and smears and cultures from mucosal aspirations were negative for *E. histolytica.* The patient had regained his normal strength and weight.

Figure 4.—Lateral roentgenogram of chest after completion of therapy.

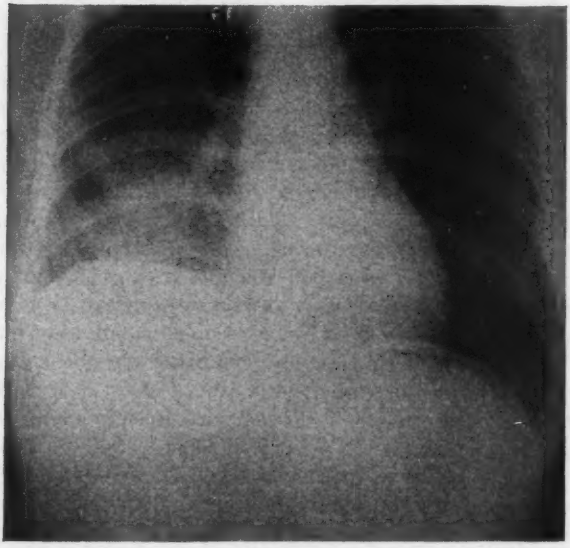

Figure 5.—Anteroposterior roentgenogram of chest after completion of therapy.

Figure 6.—Roentgenogram of abdomen at time of pulmonary relapse. Liver and spleen no longer enlarged.

DISCUSSION

The diagnosis of intestinal amebiasis with hepatic abscess and pleuropulmonary involvement was proved in this case by the recovery of *E. histolytica* from the stool or intestinal mucosa on four occasions and from the sputum on two occasions. Normal mucosa and negative smears and cultures from mucosal aspirations from six sigmoidoscopic examinations were taken as evidence of recovery from the intestinal disease. Disappearance of hepatic tenderness and enlargement 4 months prior to discharge were taken as evidence of healing of the hepatic abscess. The stability of the pulmonary condition by roentgenogram and physical findings for 2 months was taken as evidence of healing of the pleuropulmonary involvement. The author believes that quinacrine played a decisive role in the patient's recovery since he became afebrile on two occasions within 36 hours after starting treatment with quinacrine, and the intestinal lesions and hepatic lesions showed definite evidence of having healed during the first course of therapy with this drug. That carbarsone had no effect on the pulmonary disease was shown by the patient's relapse when quinacrine was discontinued and carbarsone started. Aureomycin, in the dosage used, appeared to have no effect on the amebas within the pleural cavity because motile trophozoites were recovered on two occasions 5 days after therapy with the drug was started and the fever continued unabated until quinacrine was restarted.

CONCLUSIONS

Quinacrine is a safe and effective agent in the treatment of amebiasis, in the dosage recommended. The drug reaches pleural and hepatic lesions in effective quantities.

Recurrent Subluxation of the Ankle Joint[1]

KNOX DUNLAP, *Colonel, MC, U. S. A.*
EDWARD F. WIERZALIS, *Captain, MC, A. U. S.*

IN THIS article "subluxation" refers to an incomplete dislocation which may be associated with pain and instability of the joint involved. It may be congenital or acquired and can usually be demonstrated in roentgenograms taken in special positions. A "sprain" is a minute tear of a ligament about a joint, usually associated with pain, particularly on motion. There is no dislocation and no change in the joint can be seen in the roentgenograms.

Recurrent dislocations or recurrent subluxations of the ankle joint caused by rupture of the external ligaments of the ankle are frequently undertreated with local procaine infiltration and adhesive strapping. Prolonged temporary and often permanent disability may result. These conditions may for a long time masquerade as sprains and are often diagnosed as "weak ankles." Routine roentgenograms of the ankle do not reveal subluxation, but when the foot is placed in the equinus position and then inverted, subluxation is found. Habitual subluxation of the ankle joint usually occurs in inadequately treated sprained ankles. Leonard[2] reported 51 cases of inversion injuries. He found 23 to have spontaneously reduced subluxations, discovered when the patient was given a general anesthetic or local injections into the sprained ankle and his foot was placed in the equinus inversion position. After 6 weeks of skin-tight immobilization in plaster casts followed by elastic strapping for 2 to 3 weeks, he saw no subluxation in roentgenograms taken in the forced equinus inversion position. Twenty-four patients with sprained ankle were treated with procaine and taped because roentgenograms in the equinus inversion position did not show subluxation. Seven patients of this series had permanent disability and pain over the anterior fibular ligament. Four

[1] Percy Jones Army Hospital, Battle Creek, Mich.

[2] LEONARD, M. H.: Injuries of the lateral ligaments of the ankle; a clinical and experimental study. J. Bone Surg. 31: 373–377, Apr. 1949.

others had recurrent subluxations as a result of inadequate treatment of an acute sprained ankle.

The literature has been meager on the relative importance of the various lateral ligaments in maintaining ankle stability. Most authors in the past have stated that the calcaneofibular ligament is the most important, and that it is the one most commonly ruptured, resulting in the greatest degree of instability. Pennal,[3] by cutting the calcaneofibular ligament of fresh cadavers, obtained only about 4 degrees of ankle instability demonstrated by roentgenogram, and by cutting the anterior talofibular ligament was able to obtain 12 degrees. Leonard presented a classic experimental study in his research on the lateral ligaments of the ankle and on studying 7 preserved cadavers he demonstrated the relative importance of the calcaneofibular and the talofibular ligaments. Following these studies he proved by roentgenograms that the anterior talofibular ligament was the most important component of the external collateral ligaments of the ankle. In the cadaver studies, when the anterior talofibular ligament was cut, the ankle was relatively stable at 90 degrees (fig. 1) but when the foot was placed in the equinus position and then inverted, the ankle was less stable and there was subluxation of the talus (fig. 2). When the

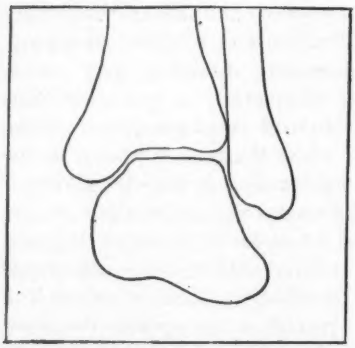

Figure 1.—Position of ankle when talofibular ligament has been cut. Stability with foot in inversion at 90 degrees is shown.

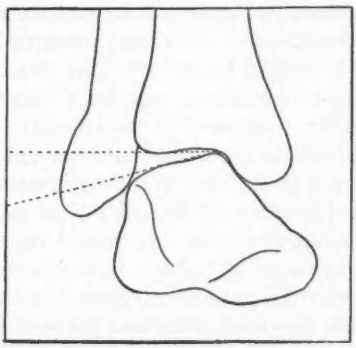

Figure 2.—Position of ankle when talofibular ligament has been cut. Stability when foot is inverted in equinus position is shown.

calcaneofibular ligament was cut and the ankle inverted at 90 degrees, there was increased motion in the subtalar joint, but no subluxation of the talus (fig. 3). When the foot was placed in the equinus position and inverted, the ankle was again stable with no subluxation of the talus (fig. 4). When the calcaneofibular and the anterior fibular ligaments were cut, there was great instability. Cutting the posterior

[3] PENNAL, G. F.: Subluxation of ankle. Canad. M. A. J. 49: 92–95, Aug. 1943.

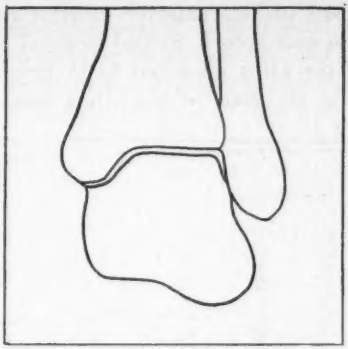

Figure 3.—Position of ankle when calcaneofibular ligament has been cut. There is no subluxation with foot inverted at 90 degrees.

Figure 4.—Position of ankle when calcaneofibular ligament has been cut. Stability when foot is inverted in equinus position is shown.

talofibular ligament permitted extreme dorsiflexion, but the ankle remained stable. More dorsiflexion was possible when both the posterior talofibular and calcaneofibular ligaments were cut. When all three ligaments were cut the ankle was grossly unstable.

Most sprains of the ankle occur when the foot is in plantar flexion during forward propulsion. Leonard, in his cadaver studies, found the calcaneofibular ligament to be perpendicular and the anterior talofibular ligament to be parallel to the long axis of the talus when the foot was in the normal (standing) position (fig. 5). In the equinus position the relationship of the ligaments is changed. The calcaneofibular ligament is parallel instead of perpendicular and the anterior talofibular ligament is perpendicular to the long axis of the talus, showing that it is taking most of the stress and strain (fig. 6). This is the relationship in most inversion injuries.

Prior to operation, the history usually discloses that the patient has been treated for months or even years by massage, electricity, manipulation, or ankle straps of various types, and usually with the diagnosis of a "weak ankle." In the Watson-Jones[4] technic, the peroneus brevis tendon is dissected from its muscle belly and muscle fibers and the tendinous portion severed. The distal end of the proximal part is sutured to the peroneus longus so that the power of active eversion is not impaired. The distal end of the tendon is freed as far as the lateral malleolus. The annular fibers that hold it in position behind the fibula are not disturbed. A quarter-inch hole is then drilled horizontally from the posterior to the anterior margin of the lateral malleolus, emerging

[4] WATSON-JONES, R.: Fractures and Joint Injuries. 3d edition. Williams & Wilkins Co., Baltimore, Md., 1943.

at the point where the anterior head of the anterior talofibular ligament is normally attached. A second hole is drilled vertically in the outer margin of the neck of the talus immediately in front of the articular surface, emerging in the roof of the sinus tarsi.

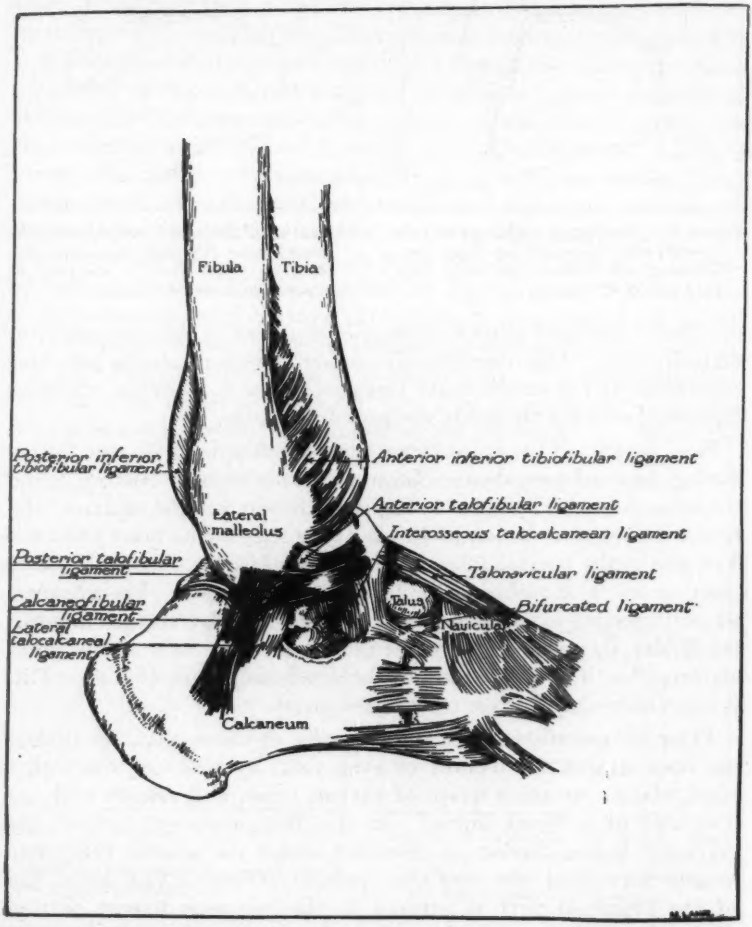

Figure 5.—Normal relationship of the lateral ligaments. The calcaneofibular ligament is perpendicular and the anterior talofibular ligament is parallel to the long axis of the talus.

The end of the tendon is guided through these drill holes and sutured to the periosteum over the tip of the lateral malleolus, where the middle band of the external ligament is normally attached. Occasionally the operation has to be modified because the second drill hole in the malleolus or the hole through the talus cannot be

made because of lack of bone structure. Watson-Jones stated that in one case he sutured the end of the tendon to the ligaments in the sinus tarsi. Following this the ankle is usually immobilized for 8 weeks.

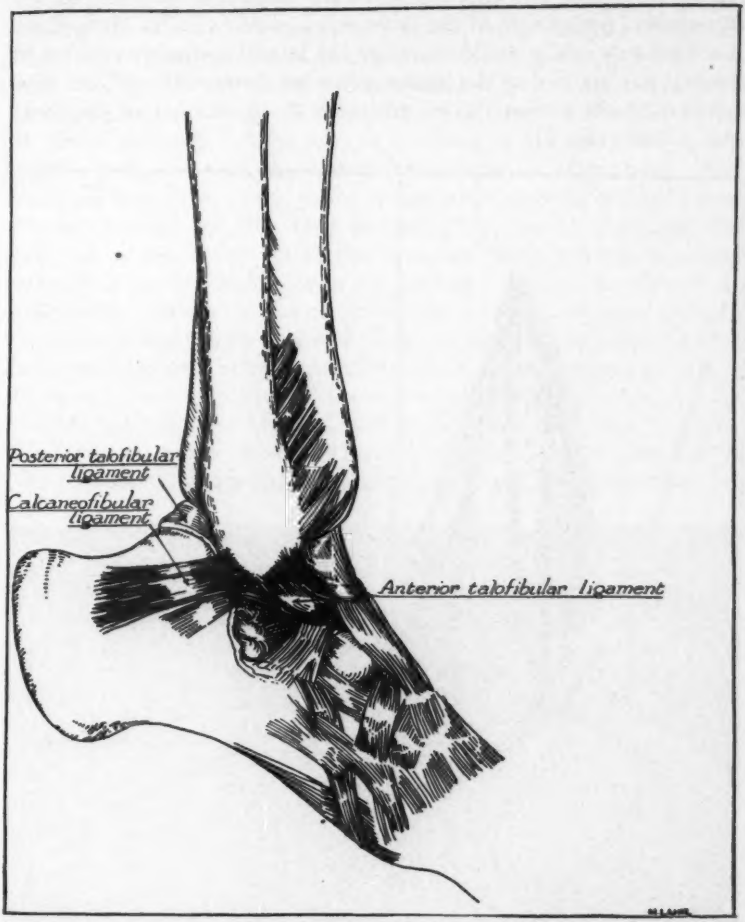

Figure 6.—Foot in equinus position. The calcaneofibular ligament is parallel and the anterior talofibular ligament is perpendicular to the long axis of the talus.

In modification of the Watson-Jones operation we use only one-half of the peroneus brevis tendon in reconstructing the anterior talofibular ligament. The upper portion of the tendon of the peroneus brevis is dissected free from muscle and the peroneus brevis tendon is then split in half. It is difficult to thread the whole tendon

through the quarter-inch hole in the lateral malleolus because the tendon is too thick. The freed distal portion of the peroneus brevis tendon is laced through the quarter-inch hole drilled through the lateral malleolus and through the drill hole in the talus. If a hole cannot be drilled through the talus, the tendon is attached to the capsule and periosteum of the talus and ligaments in the sinus tarsi. A second hole can be drilled through the lateral malleolus parallel to the first and the end of the tendon threaded through it. If this cannot be done, the tendon may be sutured to the periosteum of the fibula and to itself (fig. 7).

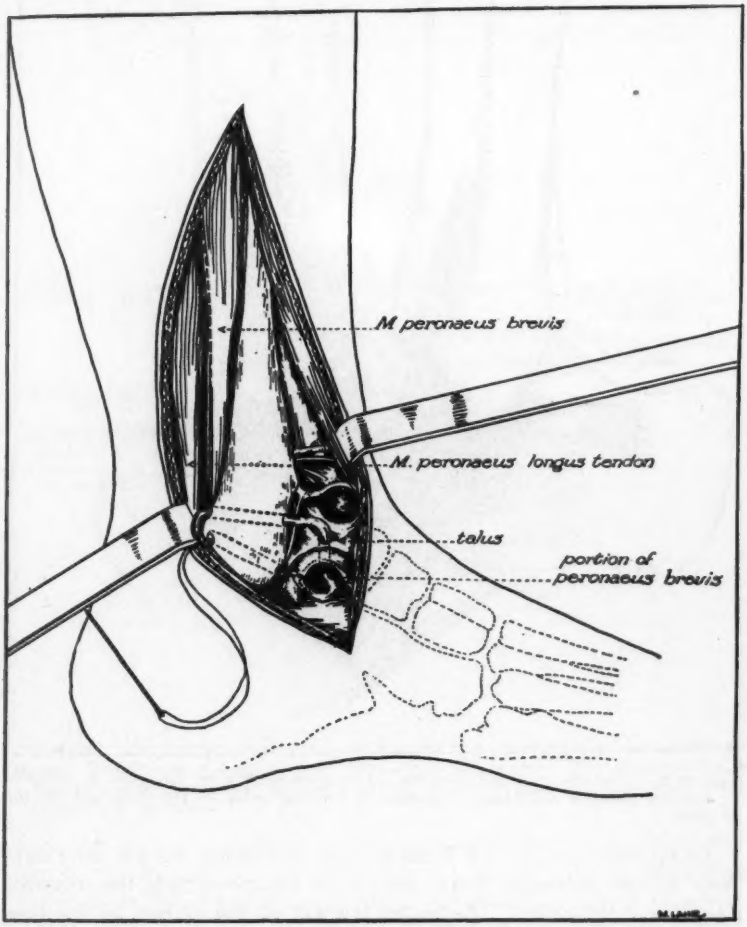

Figure 7.—Modified Watson-Jones operation for recurrent subluxation of the ankle joint.

CASE REPORTS

Case 1.—A 23-year-old soldier, while on basic training in July 1944, severely sprained his left ankle. He did not know whether his foot was in plantar flexion at the time of sprain. Following the sprain his ankle was greatly swollen and tender, with about one-plus pitting edema. At this time his sprained ankle was treated by strapping. Since July he had sprained his ankle about four times every month, but each time it was sprained it was treated at various dispensaries with strapping and injections. The patient was admitted to this hospital on 26 November 1949. Roentgenograms taken of the left ankle in the equinus inversion position showed the subluxation of the talus. The right ankle of this patient placed in a similar position did not reveal any subluxation (fig. 8). On 6 January 1950, about 6 years after the original injury, a portion of the peroneus brevis tendon was laced through a quarter-inch hole in the lateral malleolus, posteriorly to anteriorly. Because it was not quite long enough to be laced through the talus, it was merely attached to the periosteum and capsule of the talus and ligaments in the sinus tarsi, and then in turn sutured to itself, forming a loop (fig. 9). The anterior talofibular ligament was reconstructed. A long leg cast was applied and worn for 6 weeks. When the cast was removed, the patient was started on whirlpool baths and active and passive resistive exercises. Roentgenograms taken of

Figure 8.—Case 1. Roentgenogram showing right and left feet inverted in the equinus position reveals stability of the right ankle and subluxation of the talus of the left.

Figure 9.—Case. 1. Postoperative roentgenogram of left ankle in forced equinus inversion position, showing the stability of the ankle joint.

the left ankle with the foot in forced equinus inversion position did not show the previously demonstrated subluxation (fig. 9). The patient was discharged to duty.

Case 2.—A 19-year-old soldier while running stepped into a foxhole on 28 February 1949 and twisted his left ankle. At this time he sustained a simple fracture of the lateral malleolus. Following this injury there was a great deal of swelling, particularly of the lateral aspect of his ankle. His leg was immobilized in a plaster cast for 6 weeks. He received physical therapy for about 2 weeks and was discharged to duty. After being discharged the pain and swelling persisted and he periodically went to sick call where the ankle was treated by strapping and injections of procaine. On 15 November he was admitted to this hospital. The physical examination was negative except for some swelling over the lateral aspect of the left ankle.

Roentgenograms of the left ankle in forced equinus inversion position revealed a subluxation of the talus. The right ankle in the same position did not reveal any subluxation (fig. 10). On 19 January 1950, a modified Watson-Jones reconstruction of the external lateral ligament of the left ankle was performed, and in this case a portion of the peroneus brevis tendon was used. The mobilized portion of the peroneus brevis tendon was laced through the lateral malleolus anteriorly to posteriorly with countersinking of the tendon into a drill hole into the os calcis. The remaining portion of the tendon was left attached. Postoperatively, the patient did well. His leg was immobilized in a plaster cast for 6 weeks. Following the removal of the cast the patient was given physical therapy. The postoperative roentgenogram with the foot in forced equinus inversion position did not reveal a subluxation of the talus (fig. 11) and the patient was returned to duty.

It is of interest that in spite of immobilization of this patient's ankle in plaster for 6 weeks following the fracture he had a subluxation. Although a skin-tight plaster cast might have prevented this, there

Figure 10.—Case 2. Roentgenogram showing right and left ankles in forced inversion in the equinus position reveals stability of the right ankle and subluxation of the talus of the left.

Figure 11.—Case 2. Postoperative roentgenogram of the left ankle in forced inversion in equinus position showing stabilization of the talus.

are probably some cases in which the injury to the external lateral ligaments is so severe that even with immobilization they do not heal properly.

CONCLUSIONS

Recurrent subluxations of the ankle, masquerading as sprains, are usually undertreated with procaine infiltration and adhesive strapping. Routine roentgenograms do not reveal the underlying pathologic change. The anterior talofibular ligament has been found to be the most important component of the lateral ligaments of the ankle. Roentgenograms of severe ankle sprains should be taken in inversion and at 90 degrees if the tenderness is posterior to the tibia. If the tenderness is anterior to the tibia, roentgenographic examination should be made with the foot in the equinus inversion position. Sprained ankles should be immobilized for 6 weeks in a skin-tight cast. The cast should be changed in the third week. Elastic tape should be used for 2 or 3 weeks after the cast is removed.

Management of Craniocerebral Injuries

THOMAS H. GREEN, *Captain, MC, A. U. S.*

BECAUSE of their frequency in time of war, craniocerebral wounds are a common problem in military medicine. In peacetime also many patients enter Army hospitals because of head injuries, sustained for the most part in vehicle accidents. In no other type of case is nursing care more important because these patients are often unconscious. Three factors are considered in classifying these wounds: (1) the condition of the patient, (2) the type of wound, and (3) the nature of the injury to the brain. A useful classification is as follows:

Class I.—The conscious patient who is not in shock and who has no abnormal neurologic findings but may have a lacerated scalp, a simple concussion, or a skull fracture without severe brain damage.

Class II.—The patient whose state of consciousness is lowered, who has a varying degree of shock, but who responds to stimuli, exhibits reflexes, and may even show localizing neurologic signs.

Class III.—The patient who is comatose, in profound shock, unresponsive to all stimuli, and without reflexes.

A patient who falls initially into one of these classes may or may not improve under observation and may progress from Class III to Class II—a favorable sign—or regress from Class I into Class II or even III, as frequently occurs when an intradural hemorrhage is present. Thus, classification is of great importance in following the patient's course and is also of significance in prognosis. Perhaps its greatest value lies in aiding the surgeon in choosing the most opportune time to operate.

Condition of the patient.—Ideally, a patient is operated on only when he is in Class I. Past experience has shown that operations performed on Class III patients result in 100 percent mortality. Furthermore, operation within the first 12 to 24 hours yields similar results. Thus, it is important to allow sufficient time for recovery

from the initial shock and if possible to nurse the patient into Class I or at least into the upper Class II levels before operating. Any operation must be based on a firm conviction that some condition amenable to surgical treatment exists, backed up by objective findings or a suggestive clinical course and not by mere hunch. The old adage "When in doubt, operate," leads to disaster. To follow such a course may deprive a seriously ill patient of his only chance for recovery. The advent of chemotherapy has allowed the surgeon more discretion in choosing the appropriate time for operation, but the growing awareness of the nature and importance of the cerebral shock that follows every head injury has led to greater care in selecting the right cases and the right time for operation and the great improvement in the results.

Type of wound.—Head wounds may be closed, open, or intermediate depending respectively on whether the dural envelope is intact, widely open, or open but plugged by herniating brain or soft tissue of the scalp. Consideration of this factor is of primary importance to the surgeon, as it determines the management of the wound and also has a bearing on the potential development of infection and increased intracranial pressure.

The nature of the injury to the brain.—It must be determined whether concussion, contusion (bruising of the cerebral tissue), or laceration (actual break in continuity of the brain substance) of the brain is present. Concussion is a completely reversible, brief disturbance in cerebral function, from which there is spontaneous recovery without residual damage. It can be thought of as a shaking up of the molecules or perhaps of electric charges in the nerve cells, with temporary loss of function followed by complete recovery and without any actual tissue damage. This loss of function usually lasts only a few seconds and rarely more than 45 to 60 minutes. Persistent coma is caused by actual brain damage.

Diagnostic observations.—To the nurse is usually entrusted the task of making and recording on a chart certain clinical observations that are of the utmost value to the physician as he follows the progress of a patient. Sudden or progressive changes in certain of these signs often are the only evidences of deterioration of the patient's condition that may demand operative intervention or some immediate therapeutic measure. It is often the nurse, and frequently the night nurse, who may first note such important danger signs as:

1. Evidence of a change in the state of consciousness (increasing apathy, drowsiness, confusion, or deepening coma) probably signifying increasing intracranial pressure, which in turn may be caused by edema or intracranial hemorrhage.

2. Changes in the blood pressure, pulse, and respiration which should be checked every 15 to 30 minutes in the early stages because these changes usually warn of an impending dangerous increase in intracranial pressure with resultant failure of the body's compensatory mechanisms. (Of most importance is the pulse pressure, which will begin to decrease, usually with an increase in the diastolic pressure associated with a rising pulse rate. Similarly, damage to the respiratory center as the pressure increases will be reflected in irregular, rapid, labored breathing.)

3. An early rise in the rectal temperature may be indicative of intracranial hemorrhage, usually into the subarachnoid space; a rise above 102° F. within the first 24 hours is a grave sign.

4. Later elevations in the rectal temperature warn of impending hyperthermia, and active measures should be instituted immediately to prevent it or to diminish its severity.

5. Gross neurologic abnormalities (a difference in the size of the pupils, weaknesses or paralysis, and convulsions) provide the early signs of localization of brain damage or pressure. It is important to note the nature, side, and parts of the body involved if any convulsions occur.

The physician's examinations are of similar value and it is from simple neurologic tests and careful, frequent observation of the patient and his chart, not from elaborate and complicated tests, that (1) the progress of the patient is followed, (2) the decision, as to whether or not a surgical lesion is present, is made, and (3) the best time to operate is determined.

The patient reported here illustrates many of the important points in the management of this type of case.

CASE REPORT

A 35-year-old man was admitted to the hospital at 1030 hours, 7 October 1949, 12 hours after he had fallen down a stairway, striking his head against the wall and floor. He was taken to a dispensary where he was found to be comatose, areflexic, unresponsive to all stimuli, and incontinent. His pupils were dilated and did not react to light. He was bleeding from both ears and nostrils. His blood pressure was 90/60, pulse 90, and respirations between 25 and 35. He was retained in the dispensary for 10 hours and given oxygen and stimulants. His state of consciousness seemed to improve slightly, with gradual return of reflexes and responses to painful stimuli, and stabilization of his blood pressure at 140/75 and his pulse at 100. As his reflexes and muscular tone returned, he appeared to have a right-sided hemiplegia.

Examination, following transfer to the hospital, revealed a comatose man with a blood pressure of 135/70, pulse rate 80, respiration 25, and rectal temperature 101.6° F. There were no external head wounds nor palpable skull fractures. The neck was supple. The chest, heart, lungs, abdomen, and extremities were normal. The pupils were normal, equal, and reacted to light. Extraocular movements were normal. There was clotted blood in both ears. There was no visible facial weakness and the tongue showed no deviation. Muscle tone was increased but equal bilaterally in both upper and lower extremities. The Babinski, Oppenheim, and Chaddock reflexes were positive bilaterally. The deep tendon reflexes were slightly more active on the right and sustained ankle clonus was present on the right. A diagnosis of basal skull fracture, with cerebral concussion and cerebral contusion on the left side, was made.

The following regimen was instituted: (1) bed rest in medium Fowler's position, (2) liquids as tolerated by mouth and fluids by clysis as indicated, (3) 100,000 units of penicillin intramuscularly every 6 hours, (4) inlying urethral catheter, (5) paraldehyde in small doses as necessary to control restlessness, and (6) careful observation of blood pressure, pulse, respiration, rectal temperature, and fluid intake and output. In the first 3 days of hospitalization there was no essential change in the patient's condition except for the gradual disappearance of the sustained ankle clonus on the right. His blood pressure, pulse, and respiration remained stable and his rectal temperature ranged around 100° F.

From the fourth through the seventh hospital days his general condition improved slightly. He seemed vaguely aware of his environment, responded to simple commands, phonated sluggishly though unintelligibly, and took fluids by mouth. He was quite somnolent most of the time, though there were occasional periods of restless hyperactivity. The mild right hemiplegia persisted and ptosis of the left upper eyelid appeared. On the seventh hospital day a faint suggestion of choking of the left optic disk appeared, suggesting a possible subdural hematoma on the left side. In view of the presence of the hemiplegia immediately following his accident, his good general condition, and the stability of his pulse, temperature, and respirations, he was carefully observed with particular reference to the development of more definite signs of a localized space-occupying lesion. A neurologic consultant confirmed the presence of the right hemiplegia and ptosis of the left upper eyelid but could not be certain of the presence of early choking of the left optic disk. Roentgenograms of the skull obtained at this time revealed multiple irregular fracture lines without depression in the left frontal and parietal and

right frontal regions. The basal skull fracture could not be demonstrated.

In the next 2 days his somnolence seemed to increase, the left optic disk showed even more definite signs of choking, and on the afternoon of 16 October there was a slight but definite dilatation of the left pupil. Preparations for an exploratory trephining of the skull to be performed the next morning were, therefore, made. In the next 6 hours, however, there was a sudden and rapid deepening of the coma, increase in the dilatation of the left pupil, rise in the rectal temperature to 102° F., and impairment of the respiratory center, manifested by irregular, gasping respirations at a rate of 40 to 64. Accordingly following the administration of 100 cc. of 50 percent glucose solution and the administration of oxygen by nasal catheter, an exploratory left parietal craniotomy was performed immediately under local anesthesia. The irregular linear fracture lines seen on the roentgenogram were readily identified in the left frontoparietal region. Through a craniotomy defect about 5 cm. in diameter the dura mater was opened and there was an immediate outward gush of bloody fluid under pressure, the stream rising 3 or 4 inches. A moderately large subdural clot was then removed with forceps and by irrigation with distilled water through a catheter inserted in all directions over the entire left cerebral hemisphere. The underlying cortex appeared moderately contused in the parietal region, but the brain reexpanded rapidly and there was no significant cerebral edema. The dura was closed by use of a small patch of temporalis fascia.

The patient tolerated the procedure well, and although in the immediate postoperative period his rectal temperature rose to 104.6° F., his condition seemed slightly improved, his respirations returned to a normal rhythm at the rate of 30 to 35, and his blood pressure and pulse stabilized at 90/60 and 140 respectively. In the next 12 hours his rectal temperature fell gradually to 100° F., returning to normal on the fourth postoperative day. Similarly, pulse, blood pressure, and respirations gradually returned to normal in the next 3 days. Postoperatively he was placed in a medium Fowler's position, received oxygen continuously by nasal catheter until the fourth postoperative day, was given fluids by mouth beginning on the second postoperative day, and received 100,000 units of penicillin every 3 hours. Within 36 hours he had regained consciousness, was vaguely aware of his surroundings, and spoke sluggishly. The right hemiplegia remained as did the ptosis of the left upper eyelid, but he moved his right arm and leg slightly and the left pupil was less dilated and reacted to light.

In the next week there was striking improvement. His food and fluid intake were excellent. The left pupil returned to normal size and the changes in the optic disk were reversed. The ptosis of the

left upper eyelid began to clear. Use of the right arm and leg returned gradually with no abnormal reflexes present. He was able to be up and about each day. The sutures were removed on the eighth postoperative day. His mental condition improved but there were periods of mental confusion. He was able to speak intelligibly most of the time. A moderate degree of nominal aphasia persisted but seemed to be clearing slowly.

Comment.—This was a typical example of the type of nursing problem encountered in dealing with head injuries. Attention was given in the early days of his hospitalization chiefly to maintaining life and the success of the program was largely dependent on the excellent nursing care he received. When the need for operation arose, he had sufficiently recovered from the initial trauma to withstand it. Having thus set forth general strategic plans, some of the most important details in the nursing care of head injuries will be described.

MANAGEMENT OF THE PATIENT

Many texts expound details of treatment rather than principles, and in so doing the really important aims of treatment are forgotten in the haste to attend to this or that minor detail. The principles to be followed in order of importance are: (1) keep the patient alive, (2) allow the brain to recover from the profound shock it has received, and (3) prevent sequelae. Far too often the emphasis is placed on the third goal to the exclusion of the others, and the result is as the old saying goes "The operation was a success, but the patient died." Less than 10 percent of all craniocerebral injuries require operation, and even in that 10 percent the patient must first be kept alive and brought into condition for operation.

Cerebral shock is by far the most important result of an injury to the brain. It differs from ordinary surgical shock in originating entirely within the nervous system. It is not caused by blood or fluid loss and it is not benefited by, and may even be aggravated by, infusions of blood or plasma. The best treatment for it is rest and absolute quiet. That often means leaving the patient on the litter, leaving his clothes on, and postponing the routine bathing of dirty or blood-stained face and hands. Rest is usually best accomplished in Fowler's position because this helps to prevent cerebral edema, promotes drainage of the secretions from the oropharynx, and reduces the chance for the airway to become blocked. Stimulants are rarely indicated. What the brain needs is rest and administering a stimulant is like "whipping the tired horse."

Oxygen exchange.—Delivery of oxygen to the brain is the key function which is endangered by an injury to the brain or its cov-

erings. Although it is important, therefore, to administer oxygen to all seriously ill patients by nasal catheter, Boothby mask, or tent, the administration of oxygen is not enough; the airway must be checked constantly and secretions removed from the upper respiratory tract as they form, in order to guarantee that the oxygen actually reaches its destination.

Hyperthermia.—One of the most important of the medullary centers and the one by which the patient "lives" during recovery is the heat-regulating center. Hyperthermia is a grave prognostic sign indicating failure of this center and must be vigorously combated. The diagnosis is easier if the patient's skin is cool and dry in spite of a temperature of 104° to 106° F. It is important to bring the temperature down to a more normal level as rapidly as possible and to maintain it at normal or nearly normal. This is done by means of alcohol sponge baths, ice-water enemas, or removal of all bedclothes.

Fluid intake and output.—It is necessary to provide a minimal amount of fluid to preserve kidney function. This is given by mouth whenever possible. Overhydration, particularly by intravenous fluid administration, is dangerous as it augments the tendency toward the development of cerebral edema already present. An inlying catheter is often of aid in facilitating nursing care and in addition permits more careful observation of the urinary output.

Restlessness is nearly always a problem at some time or other in the treatment of a serious head injury. There are various methods of controlling this symptom, but the important thing is to determine if possible its type and cause. Codeine will quiet the restless moaning of the patient in pain without depressing respiration or constricting the pupils. Paraldehyde will control the delirium of mental confusion. The barbiturates are useful in treating the purposeless hyperactivity resulting from irritation of the central nervous system, such as is associated with subarachnoid or intracranial hemorrhage. Ordinarily, however, neither morphine nor the barbiturates should be given to a patient with a head injury because of their depressant effect, particularly on the respiratory center. Restraints are sometimes necessary to control extreme restlessness and to protect the patient from further injury. In addition, certain more specific measures such as catheterization, to relieve the restlessness caused by a distended bladder, and cooling baths, to relieve hyperthermia, may often bring immediate results.

Chemotherapy.—Ninety to ninety-five percent of all head injuries require no operation. There are, however, one or two nonsurgical therapeutic tools at our command. One of these is chemotherapy and chiefly penicillin. The advent of the antibiotics has made two dis-

tinct, although interrelated, contributions to the treatment of head injuries. Through their use, we are able to prevent or control the infections that formerly nearly always accompanied compound fractures involving the paranasal sinuses. Often in the days before antibacterial drugs were available, it was the resulting meningitis or brain abscess, rather than the injury itself, that killed the patient. Of perhaps more importance, however, is the fact that through the ability to control infection by antibiotics, operations formerly considered absolutely necessary if infection were to be avoided, are now no longer necessary, and we are able to allow the patient to recover from the initial cerebral shock, the real danger to life, before attempting to operate. As proof of the advantage thus gained, contrast the mortality rate of 34 percent for craniocerebral injuries in World War I with 6 percent in World War II.

Intravenous infusion.—Another useful therapeutic maneuver is the use of hypertonic solutions to relieve a sudden, dangerous increase in intracranial pressure caused by cerebral edema. By their hypertonicity, these fluids, of which 50 percent glucose solution is probably the best, temporarily withdraw excessive amounts of fluid from the cerebral ventricles and tissue and may, by temporarily reducing the intracranial pressure, give the vital centers a rest and a chance to recover, thus turning the tide.

Lumbar puncture may be mentioned only to condemn its use in the treatment of acute head injuries because:

1. Although it would seem a logical way in which to determine the presence of either hemorrhage into the subarachnoid space or increasing intracranial pressure, spinal fluid obtained by lumbar puncture frequently fails to reflect what is going on within the intracranial cavity, and may be under normal pressure and crystal-clear in spite of an increased intracranial pressure or subarachnoid bleeding.

2. The presence of hemorrhage may be far more easily determined by testing for meningismus and watching for early fever and rise in the leukocyte count, all indicative of subarachnoid hemorrhage.

3. Not only does a lumbar puncture often fail to give the desired information, but its performance is always disturbing to the patient and when increased intracranial pressure exists it may even be dangerous, the sudden release of pressure from below producing fatal herniation of the vital medullary structures through the foramen magnum.

4. It is impossible to decompress the intracranial cavity by this means. There is only one indication for its use and that is a massive subarachnoid hemorrhage in which case there is marked central irritation with delirium, stiff neck, and headache. In such cases, periodic withdrawal of the bloody fluid may aid in relieving these symptoms.

Surgical interference, when indicated, should be postponed as long as possible in each case. The two indications for surgical intervention are: acute intracranial hemorrhage, and compound and/or depressed fractures. Extradural hematomas are far more common than subdural hemorrhages. The patient sustains a blow on the head, often apparently of trivial nature, may experience a brief period of unconsciousness, recovers, seemingly having suffered no serious injury. This is the so-called lucid interval. Then in the course of the next few hours there is gradually deepening coma with dilatation of the pupil on the side of the injury and there may be hemiplegia or partial weakness of the limbs on the opposite side. This formation of a hematoma between the skull and the dura mater is always caused by a fracture of the skull that crosses the groove in the cranium occupied by the middle meningeal artery and vein. It requires immediate cranitomy, with evacuation of the hematoma and ligation of the bleeding vessel. Compound or depressed fractures also require surgical intervention, but here operation should be delayed until recovery from cerebral shock can be allowed to take place. Once the patient's condition is satisfactory thorough débridement of the wound and elevation of the depressed fragments is performed.

SUMMARY

The proper treatment of craniocerebral injuries is an interesting and challenging problem. One must always keep in mind the three primary objectives and their order of importance—the maintenance of life; the restoration of normal function; and the prevention of sequelae. Cerebral shock is the primary factor endangering life in the early stages, and the primary treatment is rest and efficient nursing care.

Electromyography

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THE Korean war has reemphasized the importance of the management of peripheral nerve injuries, the incidence of which is always stimulated during wartime. The prolonged period of time necessary for nerve regeneration and rehabilitation has been an anxious one for patient and physician alike as they await the final outcome and result of treatment. Recent advances in the diagnostic and prognostic study of these injuries has removed much of the doubt concerning the final results to be expected from appropriate treatment. Electromyography, which concerns the study of paralyzed skeletal muscles with the myoscope, is such an advance. Its intelligent and judicious use during the many months necessary for convalescence is a definite and necessary adjunct in clinical management by a physical medicine service, largely responsible for this phase of the patient's care.

Clinical electromyography is the recording and interpretation of voltages generated by a voluntary muscle. It can be a valuable aid in the diagnosis and prognosis of certain neuromuscular disorders. It is a clinical technic that is certain to gain wider significance as its use becomes more widespread.

BASIS

Skeletal muscles are examined directly and electric potentials generated in the muscles are conducted to a recording device where they are amplified. The study of a single motor unit is the basis of electromyography. The accepted concept of the motor unit is described as follows: "Physiologically, the 'motor unit' is defined as a motor cell, its axon process and the group of muscle fibers which this one cell innervates." [2]

ELECTRODES AND RECORDING DEVICES

Hirschberg and Abramson [3] discussed the various types of electrodes and recording devices. The coaxial needle electrode, unipolar needle

[1] Walter Reed Army Hospital, Washington, D. C.

[2] DENNY-BROWN, D.: Interpretation of the electromyogram. Arch. Neurol. & Psychiat. 61: 99–128, Feb. 1949.

[3] HIRSCHBERG, G. G., and ABRAMSON, A. S.: Clinical electromyography; physiologic basis, instrumentation, diagnostic value. Arch. Phys. Med. 31: 576–587, Sept. 1950.

electrode, and skin electrodes are the types most commonly used. The unipolar needle electrode combines skin and needle electrodes. The loud speaker, cathode ray oscillograph, and pen or inkwriter are used as recording devices. Huddleston et al.[4] quoted various authorities in support of their statement concerning the need for special and accurate equipment. They said, "Neither the electroencephalograph nor the electrocardiograph is a suitable instrument for the electromyographic examination of patients with suspected lower motor neuron disease. It has been agreed by many authorities in the field of electromyography that the use of the needle electrode technic, combined with a high gain amplifier and a cathode ray oscilloscope is essential to secure the desired diagnostic information about lower motor neuron diseases." The most satisfactory instrument in use for clinical purposes at present is the cathode ray oscilloscope coupled with audio amplification for recording action potentials by means of a screen and loud speaker. Photographic records are accomplished by means of a camera attachment or an electronic tape recorder myoscope.

AMPLIFIED RECORDED VOLTAGES

The amplified voltages that are recorded on the screen, have certain characteristics that are directly related to the neuromuscular status of the particular area of muscle tissue that is being examined. These characteristics are summarized as follows: (1) wave form, (2) magnitude of the wave, (3) duration of the wave, (4) frequency of the wave, and (5) definitive audio sound pitch and intensity.[4] A meter is present on some clinical instruments, to record readings during the maximal voluntary contraction of the muscle being examined. The screen of the instrument is a graphlike structure that plots the amplitude or voltage against the duration of the wave. Frequency and wave form are also studied, along with the sounds, all of which are characteristic. These elements may be interpreted directly from the screen or loud-speaker. It is the usual custom, however, to take photographs. These have the added advantage of permanence and are available for comparison and review at a later date.

INTERPRETATION

The electric potentials generated by a muscle fiber differ from those of a group of fibers under the control of one motor nerve cell (motor unit). The synchronous contraction of a motor unit discharges different potentials than the asynchronous contraction of a motor unit.

[4] HUDDLESTON, O. L.; GOLSETH, J. G.; MARINACCI, A. A.; and AUSTIN, E.: Use of electromyography in diagnosis of neuromuscular disorders. Arch. Phys. Med. 31: 378–387, June 1950.

It is this variation in amplitude, size, shape, duration, and frequency of the wave form that permits selective differentiation.

The following types of wave forms have diagnostic significance.

Simple motor unit.—The normal muscle at rest is electrically silent. Simple motor units are the result of normal voluntary muscular contraction. A minimal contraction usually produces more than one wave form on the screen. Stronger contractions produce numerous wave forms which coalesce and do not permit accurate study and interpretation. Maximal voluntary contractions are essential for power readings but minimal contractions producing few wave forms are preferred for diagnostic work. The wave form is usually diphasic; it may be monophasic or triphasic. The magnitude is capable of great variation. The duration is from 2 to 10 milliseconds.

Fibrillation wave forms.—Fibrillation voltages result from activity within the muscle fiber and are not under the voluntary control of the patient. They are spontaneous voltages that result from denervation, hence the term "fibrillation of denervation." Fibrillation voltages may be monophasic or diphasic. They vary in magnitude, and their duration is 1 to 2 milliseconds.

Fasciculation wave forms.—These are observed in partially denervated muscles but are not uniformly present. They are polyphasic, having more than 4 phases. They vary in magnitude and are from 5 to 15 milliseconds in duration.

Complex motor unit wave forms.—These are present in early degeneration of denervation and in the regenerative process. They are polyphasic, vary in magnitude, and have a duration of from 5 to 20 milliseconds.

Base line disturbance wave forms.—These are seen early in regenerative processes. They are elongated, rounded, monophasic waves. Simple motor unit wave forms, fibrillation and complex wave forms also have a characteristic sound pattern. Simple motor units have a thumping sound, fibrillation is heard as a sharp clicking sound, and complex motor units have a harsh low-pitched sound.

UTILIZATION

Electromyographic technics are used to aid in determining the cause of paralysis of skeletal muscles. "It is possible to make a differential diagnosis among the following conditions:

1. Primary muscular dystrophies and primary muscular atrophies.
2. Lower motor neuron lesions and upper motor neuron lesions.
3. Disuse atrophy and denervation atrophy.
4. Physiologic block and lower motor neuron lesions.

5. Organic paralysis and functional paralysis.

6. Backache caused from acute and chronic postural strain and that caused from nerve root compression lesions." [4]

DISCUSSION

Electromyography is an accurate aid to the physician in the diagnosis of neuromuscular disorders. The cathode ray oscilloscope electromyograph equipped with sound amplification and used with needle electrodes provides characteristic wave and sound patterns that must be interpreted in the light of clinical findings. It is essential that the physician who undertakes electromyographic studies have a basic knowledge of neurology; he must be able to recognize the indications for study and the proper muscles to sample. He must know the location of the muscles, their nerve supply, and their spinal nerve root derivation. He must be certain that the needle has been inserted into the proper muscle if his interpretation of findings is to be accurate. Electromyographic studies provide valuable information in any disease or injury affecting the lower motor neuron. They are of value, indirectly by the absence of positive findings, in conditions affecting the upper motor neuron.

SUMMARY

Clinical electromyography is the recording and interpretation of voltage discharges generated by voluntary muscle. The motor unit which consists of a motor cell, its axon process, and the group of muscle fibers which this one cell innervates is the basic unit of study. It is studied indirectly by direct examination of its muscle component. Voltages generated in the muscle are amplified and recorded for visual and sound reproduction by a cathode ray oscilloscope with audio attachment. The amplified, recorded voltages have definite characteristics which are constant and permit interpretation. Electromyographic technics are useful in the study of paralysis and skeletal muscles. The electromyographer must have a basic knowledge of neurology and must know the location of the muscle, its nerve supply, and spinal root derivation.

Talcum Powder Granuloma[1]

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CASES of talcum powder granuloma frequently have been reported in the literature since about 1933. Although the lesions have been described and their seriousness strongly emphasized, the use of talcum powder as a dusting agent for gloves in surgical operations is still widely used.

CASE REPORT

On May 1948 the right direct inguinal hernia of a 45-year-old laborer was repaired. The patient was discharged to his home at the end of 2 weeks. On 29 November he was readmitted because he had noticed a tender, swollen area at the margin of his operative incision which had gradually increased in size and was about 3 by 4 cm. The diagnoses considered were: abscess, recurrence of the hernia, and neoplasm. Under penicillin therapy for 1 week the mass diminished appreciably in size, but did not disappear. The patient returned to his home and continued his work for about 6 weeks, only to be readmitted in January 1949 because the mass had increased to 6 by 3 cm. in size; was hot, tender, movable, and was noted to fluctuate in size. Penicillin was again given, incision and drainage were accomplished with the evacuation of small amounts of necrotic tissue, which on microscopic examination were described as "chronic inflammation of the subcutaneous tissue and fascia." The wound healed and the patient returned to his home, only to return in February because of the recurrence of the mass associated with tenderness, chills, and fever. Treatment consisted of wide excision of the mass, penicillin, and small doses of roentgen therapy. The tissue removed at the time of operation was reported as "foreign body, suture material." The wound healed and the patient was discharged only to return within a few days because of a recurrence of his symptoms. Incision and drainage with evacuation of purulent material

[1] Fitzsimons Army Hospital, Denver, Colo.

was carried out. The pathologist at this time reported a "talcum powder granuloma." Wide excision of this indurated area was accomplished in August, removing skin, subcutaneous tissue, and fascia. The material removed was an extremely indurated thick layer of subcutaneous tissue which was distinguishable from the thickened fascia in this area. The hernia repair was firm and there was no evidence of recurrence. The wound was left open and closed 5 days later. In December 1950 the patient was well and there was no evidence of recurrence.

COMMENT

The serious potentialities resulting from the use of talcum powder in gloves are well demonstrated by this case. This patient's recurring condition incapacitated him for a year. Reactions to talcum powder are not confined to subcutaneous tissues, but include severe pelvic and peritoneal abscesses and adhesions, granulomas at the site of hemorrhoidectomy, fistulas, and chronic draining sinuses.[2 3] Grieco proved by animal experimentation that talcum powder caused adhesions between intestinal loops and the parietal peritoneum.[4] There is some controversy among writers as to whether the amount of powder introduced into a wound influences the severity of the reaction to the powder. Most investigators now believe that the severity of the reaction is directly proportional to the amount of talcum powder introduced. During operations the glove may tear, introducing relatively large amounts of this foreign body into the wound. It has been estimated that tear or puncture of surgical gloves occurs in 75 percent of all operations.[2]

The danger of talcum powder is often not appreciated by surgeons because of the long interval that frequently occurs between the deposition of the powder and the appearance of the lesion. It is difficult to explain why talcum powder will remain in the skin with little obvious reaction in some persons; then years later instigate a foreign body reaction. One case report indicated a lesion that had been dormant for 36 years.[5] Also because only an occasional patient suffers from this condition, proper attention may not be given to its seriousness. Lichtman et al.[5] in a review of the literature stated that one author found it necessary to perform radical resections in two patients who had severe rectal strictures caused by talcum powder granuloma,

[2] ROBERTS, G. B. S.: Granuloma of fallopian tube due to surgical glove talc; silicious granuloma. Brit. J. Surg. 34: 417–423, Apr. 1947.

[3] EISEMAN, B.; SEELIG, M. G.; and WOMACK, N. A.: Talcum powder granuloma; frequent and serious postoperative complication. Ann. Surg. 126: 820–832, Nov. 1947.

[4] RAMSEY, T. L., and DOUGLASS, F. M.: Granulomatous inflammation produced by foreign body irritants. J. Internat. Coll. Surgeons 3: 3–10, Feb. 1940.

[5] LICHTMAN, A. L.; MCDONALD, J. R.; DIXON, C. F.; and MANN, F. C.: Talc granuloma. Surg., Gynec. & Obst. 83: 531–546, Oct. 1946.

while another author performed bowel resections in several patients because of severe adhesions of the intestines caused by talcum powder.

The pathologic changes in these granulomas consists of dense infiltration of the involved tissue with chronic inflammatory cells, mostly lymphocytes. Large giant cells are situated throughout the tissues. Closely related to and frequently surrounded by these giant cells are the refractile talcum powder spicules. These crystals are identified by the use of polarized light microscopy. If polarized light were used more frequently, many more talcum powder granulomas would probably be recognized. Many patients reoperated on had been incorrectly diagnosed prior to the recognition of the propensities of talcum powder for causing such granulomas. No evidence of destruction of these nonabsorbable particles is seen so that the reaction by no means resolves the condition. Caseation is not seen. The lesions are microscopically similar to tubercles and in fact are often confused with those of tuberculosis or regional enteritis.

SUMMARY

This case illustrates the serious disability that can be caused by the use of talcum powder as a dusting agent. The literature reviewed is unanimous in condemning this agent as a dusting powder in surgery.

Pericardial Celomic Cysts

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WITH increasing frequency one finds reference to celomic cysts of the pericardium. Lam [3] in 1947 reviewed the literature and listed only 5 cases previously reported. Dufour and Mourrut [4] described one such cyst found at autopsy in an 86-year-old woman. Pickhardt [5] removed a cyst from the region of the pericardium and diaphragm of a 53-year-old woman. Lambert [6] described 3 cysts, 2 of which had been removed by Berry and one by Butler. To this group Lam added a sixth case occurring in a 39-year-old woman, who was successfully treated by surgical removal of the cyst. Leahy and Culver [7] reported 1 case and in their review of the literature found other reports by Churchill,[8] Curreri and Gale,[9] Greenfield, Steinberg, and Touroff,[10] and Kinsella.[11] Blades [12] reported 10 cases encountered during World War II in the Army Thoracic Surgery centers. Byers and Emery [13] reported a 31-year-old

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[2] Professor of Surgery, University of Arkansas School of Medicine; Surgical Consultant, Army and Navy General Hospital, Hot Springs National Park, Ark.

[3] LAM, C. R.: Pericardial celomic cysts. Radiology 48: 239–243, Mar. 1947.

[4] DUFOUR, H., and MOURRUT: Kyste de la partie supérieure du péricarde chez une femme de quatre-vingt-six ans. Bull. et mém. Soc. méd d. hôp. de Paris 53: 1482, Dec. 30, 1929.

[5] PICKHARDT, O. C.: Pleuro-diaphragmatic cyst. (Transactions of the New York Surgical Society, Apr. 12, 1933.) Ann. Surg. 99: 814–816, May 1934.

[6] LAMBERT, A. V. S.: Etiology of thin-walled thoracic cysts. J. Thoracic Surg. 10: 1–7, Oct. 1940.

[7] LEAHY, L. J., and CULVER, G. J.: Pericardial cœlomic cyst. J. Thoracic Surg. 16: 695–700, Dec. 1947.

[8] CHURCHILL, E. D.: Simple cyst of mediastinum, (Cabot Case No. 23492). New England J. Med. 217: 958–959, Dec. 9, 1937.

[9] CURRERI, A. R., and GALE, J. W.: Mediastinal cysts (Abstract). (Central Surgical Association, Feb. 28–Mar. 2, 1941.) Ann. Surg. 113: 1086–1087, June 1941.

[10] GREENFIELD, I.; STEINBERG, I.; and TOUROFF, A. S. W.: "Spring water" cyst of mediastinum. J. Thoracic Surg. 12: 495–502, June 1943.

[11] KINSELLA, T. J.: Thoracic tumors. In BAILEY, C. P. (editor): Diagnosis and Management of the Thoracic Patient. J. B. Lippincott & Co., Philadelphia, Pa., 1945. pp. 162–203.

[12] BLADES, B.: Mediastinal tumors; report of cases treated at Army Thoracic Surgery Centers in United States. Ann. Surg. 123: 749–765, May 1946.

[13] BYERS, R. A., and EMERY, F. B.: Pericardial celomic cysts; review of literature and report of case. Arch. Surg. 60: 1002, 1950.

white male veteran with such a cyst which was removed surgically. Conklin [14] reported 2 more cases.

The following case illustrates still another such cyst that was treated successfully by surgical means.

CASE REPORT

A 55-year-old white male veteran of World War I was admitted to this hospital on 1 April 1950 with a history of "nervousness" and "nervous breakdowns" of long duration. He stated that his nervous condition followed a fall in 1923. Since 1936 he had been hospitalized 11 times, usually for minor operations. He complained of continuous headaches, numbness of the arms and legs, back pain, dizzy spells, and a choking sensation. A tumor on his heart was discovered in 1948 in the course of a routine check for tuberculosis. Subsequently he was hospitalized twice elsewhere and a re-evaluation was made concerning the tumor. Each time it was believed that no surgical treatment was indicated since the roentgenograms did not show any enlargement of the tumor. He was admitted primarily to have the tumor removed. Since he first learned of the presence of the tumor, his general psychogenic musculoskeletal symptoms had become more severe despite reassurance by numerous physicians that, in all probability, the tumor mass was not the cause of his symptoms. He was seen on the medical service and given a thorough examination. He was likewise seen in consultation by the neuropsychiatrist and given clearance for any indicated operation. The roentgenologist diagnosed the condition as a pericardial celomic cyst (figs. 1, 2, and 3). The Tumor Board concurred in the diagnosis and recommended surgical exploration and removal of the tumor mass. All findings were essentially normal except for his neuropsychiatric condition and the growth in the chest.

Figure 1.—Roentgenogram of the mediastinum on inspiration.

Operative findings.—On 3 May 1950 the patient was operated on. The left side of the chest was entered

[14] CONKLIN, W. S.: Tumors and cysts of mediastinum. Dis. of Chest. 6: 715, 1950.

Figure 2.—Roentgenogram of the mediastinum on expiration. Note the change in contour of lesion in the two phases of respiration.

Figure 3.—Oblique roentgenogram of mediastinum.

Figure 4.—Lesion prior to removal.

through the seventh left interspace. After collapse of the left lung, a large, flat, ovoid pericardial cyst, about 2 by 11 by 6 cm., was found centered in the left lateral position over the superior portion of the pericardium and extending both anteriorly and posteriorly. The left phrenic nerve coursed along the left inferior border of the cyst (fig. 4). This border was freed by sharp and blunt dissection, and by this means a line of cleavage was developed which made it possible to free the entire cyst from the adjacent pericardium and mediastinal structures with a minimum of trauma. The cyst was bound to the adjacent structures by loose areolar tissues containing a fine network of capillaries. The removal of the cyst resulted in a moderate amount of capillary oozing and no true pedicle was encountered. The cyst was removed in toto without rupture.

Pathologic description.—The specimen (fig. 5) consisted of a cyst weighing 345 grams and measuring 2 by 11 by 6 cm. On the surface of this mass were two small indentations extending around half the circumference which gave an appearance of lobulation. The mass was filled with a clear straw-colored fluid. The pericardium showed a few fragments of fatty tissue attached to the mass. No sections were made.

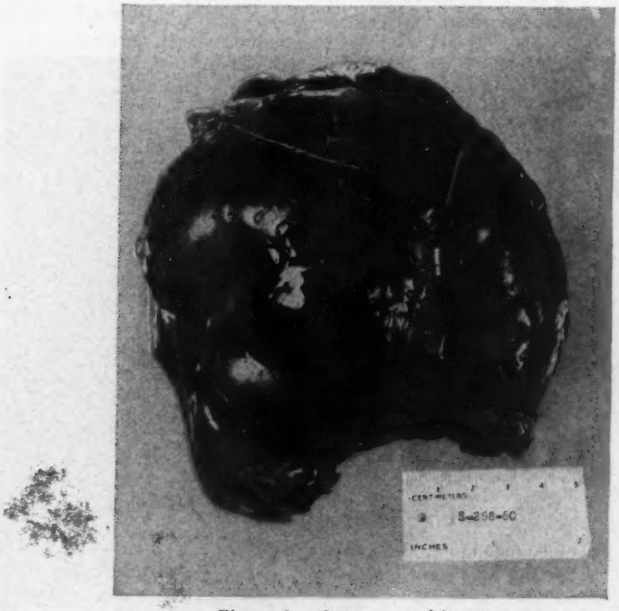

Figure 5.—Cyst removed in toto.

Diagnosis.—Celomic cyst, pericardial (congenital malformation).

Postoperative course.—This patient's postoperative course was uneventful and on the tenth postoperative day he was returned to the medical service for further evaluation and treatment. Fifteen days after the operation another roentgenogram was taken (fig. 6).

COMMENT

Laipply [15] classified congenital cysts of the mediastinum into eight groups: epidermoid, dermoid, teratoid, bronchial, esophageal, gastro-

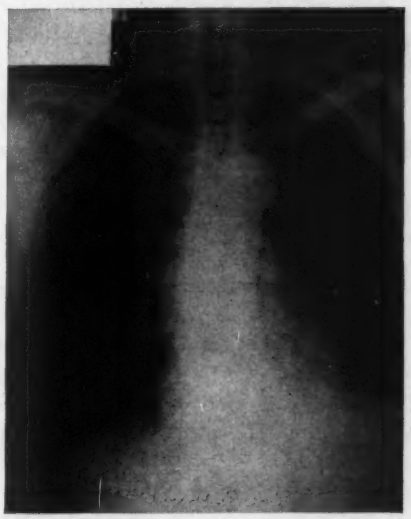

Figure 6.—Postoperative roentgenogram.

enteric, pericardial celomic, and cystic lymphangiomas. The last two groups are of mesodermal origin but differ in that the latter is usually multilocular with the cavities varying in size and shape, whereas the celomic cyst is usually unilocular. The lymphangiomas are always intimately attached and blend into the neighboring structures whereas celomic cysts are usually attached loosely by areolar tissues and seldom have a true pedicle. The blood supply of celomic cysts is secured through a fine network of capillaries. They are lined by a thin layer of mesothelium and contain clear or serosanguineous fluid.

Lambert explained the development of pericardial celomic cysts on an embryologic basis. The pericardium is formed by a series of disconnected lacunae that gradually enlarge and merge to form the

[15] LAIPPLY, T. C.: Cysts and cystic tumors of mediastinum. Arch. Path. 39: 153–161, Mar. 1945.

pericardial celom. He believed that when one of the lacunae fails to merge with the other, they persist and develop into a celomic cyst. When dealing with a suspected case of this type one must always consider the various possibilities, both congenital and acquired, as listed by Laipply. Byers and Emery also list inflammatory cysts of the pericardium and blood cysts of the pericardium following trauma and hernia as possibilities when making a differential diagnosis. Also to be considered are the neoplastic diseases of the chest, lungs, and mediastinum.

Lam noted one possible diagnostic point that should always be looked for, i. e., the marked change in contour of the mass produced by the two phases of respiration. Such a change in contour was present in the case herein reported. The presence of a radiographic shadow such as is produced by these lesions necessitates surgical intervention, for only by visual and pathologic examination can the presence or absence of malignancy be determined. Not all of the cysts have been reported as causing symptoms. It is possible, however, that they could grow to such size as to produce marked respiratory and cardiac embarrassment.

Lipemia Retinalis

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LIPEMIA retinalis was first described by Heyl[2] in 1880, and, although 64 cases in diabetic patients have been reported,[3-6] the physiopathologic factors are still inadequately understood. The condition occurs most frequently in severe diabetics, but has been described in nondiabetics.[7-9] Although the majority of patients have been in the second and third decades of life, 1 was 28 months of age and 2 were in the sixth decade. The sex incidence has not been significant.

The characteristic changes of this condition are in the arteries and veins of the retina. The earliest changes occur in the periphery where arteries and veins lose their normal coloring and develop a homogeneous pale milklike yellow or salmon color, and, in the most severe cases, a dull ivory color. Usually arteries and veins become flat and ribbonlike, and in all patients the light reflex becomes diffuse or is lost, making differentiation of arteries and veins dependent on the diameter alone. In those patients in whom the choroidal vessels are involved, the fundus assumes a lighter hue, and white streaks may be noted at the side of the vessels as they course toward the center. These processes gradually progress toward the center and regress in the same fashion.[10 11] The only other reported changes

[1] U. S. Naval Hospital, Philadelphia, Pa.

[2] HEYL, A. G.: Intra-ocular lipemia. Tr. Am. Ophth. Soc. 3: 54, 1880.

[3] KOCH, F. L. P., and STRONG, P. S.: Lipemia retinalis; report of case. Arch. Ophth. 38: 310–314, Sept. 1947.

[4] STEARNS, S.; FRIEDMAN, E.; LUGITCH, M.; and HOFFMAN, S. H.: Lipemia retinalis; report of case. New England J. Med. 238: 16–17, Jan. 1, 1948.

[5] FALLS, H. F.; Lipæmia retinalis; report of case. Arch. Ophth. 30: 358–361, Sept. 1943.

[6] MARBLE, A., and SMITH, R. M.: Blood lipids in lipæmia retinalis. Arch. Ophth. 15: 86–94, Jan. 1936.

[7] LEPARD, C. W.: Lipemia retinalis in nondiabetic patients. Arch. Ophth. 32: 37–38, July 1944.

[8] WAGENER, H. P.: Lipemia retinalis. Am. J. Ophth. 5: 521–525, July 1922.

[9] KAUFFMAN, M. L.: Lipæmia retinalis. Am. J. Ophth. 26: 1205–1208, Nov. 1943.

[10] DUKE-ELDER, W. S.: Text-book of Ophthalmology, Vol. III. C. V. Mosby Co., St. Louis, Mo., 1940 (reprinted 1945). pp. 2742–2743.

[11] ELWYN, H.: Diseases of the Retina. The Blakiston Co., Philadelphia, Pa., 1946. p. 106.

have been small retinal hemorrhages and fleeting xanthoma.[10 11] Pathologic examinations have consistently shown the retinal tissues to be normal, but the blood plasma to be loaded with fat which permeated into the perivascular spaces.[10 11] Characteristically, no visual disturbance is complained of until the precomatose state of diabetes is reached when blurring of vision sometimes occurs, but in this state the blurring may not be caused by the lipemia itself.

CASE REPORT

A 23-year-old white man was admitted to the hospital 15 February 1950. The present illness was of 4 months' duration during which time the patient developed polyuria, polydipsia, progressive weakness, anorexia, loss of 24 pounds, dyspnea, drowsiness, constipation, and blurred vision. The patient's mother had been a moderately severe diabetic since the age of 43 years. There were no other known diabetics in the family.

On admission the patient was drowsy but in good contact with his environment. Respiration was Kussmaul in type and a strong acetone odor was noted on the breath. The skin was warm and dry and lacking in turgor. The oral mucosa was pale and dry. Except for the ophthalmoscopic examination the physical examination was nonrevealing. At first glance the retina appeared devoid of arteries and veins and, on closer examination, it was seen that the pale yellow bands which traversed the retina were the arteries and veins lacking normal color and light reflex. The vessels near the optic disk were of a deeper hue than the peripheral vessels, but none presented a normal appearance. On the right retina, about midway between the disk and the fovea, a small triangular hemorrhage was seen. The rest of the retina appeared essentially normal.

Admission laboratory studies indicated a moderate increase in blood glucose with a marked decrease in CO_2 combining power and increase in blood cholesterol (table 1). The urinary sugar, acetone, and diacetic acid were 4 plus.

TABLE 1.—*Laboratory studies*

Date	Hour	Blood glucose (mg. per 100 cc.)	Blood CO_2 combining power (volume per 100 cc.)	Blood cholesterol (mg. per 100 cc.)
2-15-50	1100	247	6	944
	1530	252	12	
	1900	254	22	
2-16-50		175	41	650

The patient received a total of 6,000 cc. of fluids, consisting of 1,000 cc. of Ringer's lactate solution, 1,000 cc. of 5 percent dextrose in

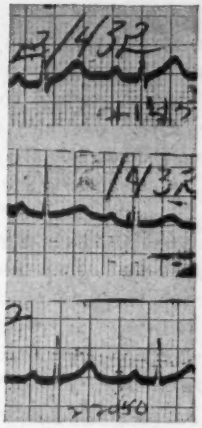

Figure 1.—Electrocardiographic changes. According to Bazzetti's formula, in which K equals the Q–T interval divided by the square root of the R–R interval, hypopotassemia exists when K equals more than 4.

normal saline solution, 2,000 cc. of sixth molar sodium lactate solution, and 2,000 cc. of normal saline solution with 335 units of regular insulin during the first 24 hours. By the end of this period the blood findings were nearing normal and the patient was greatly improved subjectively. In anticipation of a hypopotassemia, 7 grams of potassium chloride were given in divided doses orally the first day. By the end of the first 24 hours the electrocardiogram indicated a significant fall in the serum potassium in spite of the potassium chloride therapy (fig. 1) but because the patient was tolerating food well no further therapy was deemed necessary. The patient's diabetes was readily controlled and will not be discussed further.

The eye grounds improved steadily after admission and, as described for the typical patient, improvement was noted centrally first and at the periphery last. By the fifth day the fundi appeared normal. The small retinal hemorrhage had detached and floated in the vitreous, and this was resolved by the seventeenth hospital day. There was no evidence of any visual change at that time. The blood cholesterol level remained elevated for the first 2 weeks and did not reach a normal level for 4 weeks.

DISCUSSION

Lipemia retinalis is most often observed in patients with uncontrolled diabetes and diabetic acidosis, although patients have been reported [7-9] whose lipemia was not of diabetic origin. It has been noted that although lipemia retinalis is always associated with hyperlipemia, an increase in total blood lipids alone rarely gives rise to this condition. Boyd [12] was the first to observe that a lipid imbalance occurs during some hyperlipemic episodes which results in the appearance of the retinal phenomenon. He found that the degree of milkiness of the serum in hyperlipemia is not necessarily determined by the total lipid content. He also noted that phospholipids act as

[12] Boyd, E. M.: Lipid composition of "milky" blood serum. Tr. Roy. Soc. Canada 31: 11–16, 1937.

emulsifying agents holding neutral fats, cholesterol, and cholesterol esters in colloidal solution. It was then shown that with a relative decrease in phospholipids the supersaturated state of the serum is no longer maintained and excessive lipids do not go into solution but remain in the serum as chylomicrons. These particles are microscopically visible as small fat droplets and impart to the serum the milky color which is seen in the retinal vessels during an episode of lipemia retinalis.

Man and Peters [13] have observed in some patients with diabetic acidosis that the serum fatty acid values were higher than those of cholesterol or phospholipids. In their report on two patients with lipemia retinalis, Marble and Smith [6] noted that the greatest increase in blood fats occurred in the fatty acid fraction, the next greatest in the cholesterol, and the least in the phospholipid fraction.

It has been shown [14] that during diabetic acidosis a decrease in the organic acid-soluble phosphorus of the blood cells occurs, indicating a depletion of the labile phosphorus reserves of the body. These changes, associated with malnutrition and weight loss, precede the onset of the retinal manifestations. Thus, the altered serum lipid balance, especially the phospholipids, the depletion of the phosphate reserves, and the presence of a debilitating disease are important factors in the etiology of lipemia retinalis. With the institution of adequate therapy the blood lipid balance returns to normal and the lipemia retinalis disappears.

SUMMARY

A case of diabetic lipemia retinalis is a 23-year-old man has been reported. It is believed that this is the sixty-fifth case to be reported.

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[13] MAN, E. B., and PETERS, J. P.: Lipoids of serum in diabetic acidosis. J. Clin. Investigation 13: 237–261, Mar. 1934.

[14] GUEST, G. M., and RAPOPORT, S.: Organic acid-soluble phosphorus compounds of blood. Physiol. Rev. 21: 410–437, July 1941.

Congenital Duodenal Atresia

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LEE W. BASS, *Captain, MC, U. S. A.*[1]

CONGENITAL duodenal atresia is an uncommon malformation that is incompatible with life without prompt surgical intervention. A review of the literature by Leech and Pinkerton [2] in 1948 revealed that although the condition was recognized as early as 1733 there were no recoveries until 1916 when the first successful treatment was recorded by Ernst. What was believed to be the sixteenth survivor was reported by Sumner in 1945. Ladd and Gross [3] state that review of the operative results and treatment of these cases is extremely discouraging in spite of the fact that surgical management and technics have been greatly improved. Leech and Pinkerton found less than 30 records of 6-month survival in 300 such cases. This represents a case fatality rate of over 90 percent.

Promptness in diagnosis and treatment is mandatory if one is to save these young patients. Without surgical relief, death ordinarily occurs in the first week of life and Leech and Pinkerton state: "There is no record of survival beyond the twelfth day without surgical intervention."

CASE REPORT

A 6-day-old, white, premature female infant was transferred to this hospital from another Army hospital. Her persistent vomiting and weight loss suggested intestinal obstruction. The mother had one previous pregnancy which had terminated in the spontaneous delivery at 8 months of a premature male infant who developed jaundice at the age of 3 days and, after a rapid downhill course, died at the age of 13 days. Autopsy showed prematurity and multiple lung abscesses.

The patient, born 5 weeks before term on 23 September 1949, was apparently normal except for a birth weight of 4 pounds, 10 ounces. Her mother had had no rubella or other disorder during the preg-

[1] Osaka Army Hospital, Osaka, Honshu, Japan.

[2] LEECH, C. H., and PINKERTON, A. W.: Congenital duodenal atresia; report of a successful surgical case. J. Pediat. 33: 770–773, Dec. 1948.

[3] LADD, W. E., and GROSS, R. E.: Abdominal Surgery of Infancy and Childhood. W. B. Saunders Co., Philadelphia, Pa., 1941.

nancy. Twelve hours after birth, a small amount of 5 percent glucose was given by mouth and taken well. On the fourth day of life, a formula of 1 part evaporated milk and 3 parts water was started but the baby vomited each feeding. Jaundice was noted at this time. In the first 3 days of life the baby had 2 normal-looking meconium stools, but, on the fourth, fifth, and sixth days, she passed no meconium and retained no formula. She sucked well and the formula was swallowed without difficulty but from 1 to 10 minutes after the feeding it would roll out of her mouth. There was no projectile vomiting. Because of the persistent vomiting and absence of stools, a tentative diagnosis of intestinal obstruction was made and the patient was transported under oxygen by plane to this hospital.

Physical examination on admission revealed dehydration, sunken eyes, and depressed fontanels. Her weight at that time was 3 pounds, 15 ounces. The skin was icteric, dry, and of poor turgor. A mass about 1.5 cm. in diameter was palpable in the right upper abdominal quadrant but it was not typical of a pyloric tumor. The van den Bergh test gave 23.8 mg. bilirubin per 100 cc. of serum. The hemoglobin was 22 grams.

On admission the infant was not in condition for surgical treatment or even for some of the diagnostic procedures desired. The preoperative management was designed to improve the general condition, spacing the diagnosis procedures as tolerated. She was placed in an incubator with constant oxygen on arrival. Vitamin K and penicillin were given intramuscularly. Fluid intake was maintained by the intravenous and subcutaneous administration of a 2.5 percent glucose solution. Transfusions of 20 cc. of whole blood were given twice a day. On her eighth day of life she passed by rectum a small amount of material containing mucus and bile. Stomach washings yielded a yellow fluid that did not contain bile. The urine still contained no bile even though the jaundice remained intense. Gavage of 10 cc. of 5 percent glucose solution every 3 hours was started but the baby retained none of these feedings. On the twelfth day 8 cc. of lipiodol were introduced into the stomach by tube under fluoroscopy and roentgenograms were made 15 minutes and 4½ hours later (figs. 1 and 2). The stomach was normal in size and position. Peristalsis was seen fluoroscopically in the region of the pyloric antrum where there was a conical narrowing of the lumen. No lipiodol passed beyond this point. On the same and following days the baby passed normal-appearing meconium stools containing bile but no cornified epithelial cells. On her thirteenth day of life she had reached maximum improvement in preparation for operation. She was well hydrated, her hemoglobin was 22 grams and her weight was 4 pounds,

Figure 1.—Preoperative roentgenogram taken 15 minutes after introduction of lipiodol. Note absence of air in the intestinal tract distal to the pylorus.

6¼ ounces. After passing a catheter into her stomach, she was taken to surgery.

Under open drop ether anesthesia, the abdomen was entered through a right paramedian muscle-splitting incision extending down to the level of the umbilicus. Exploration of the abdomen revealed a dilated stomach and a contracted jejunum, ileum, and colon. The diameter of the jejunum and ileum was about 5 millimeters. Even though the

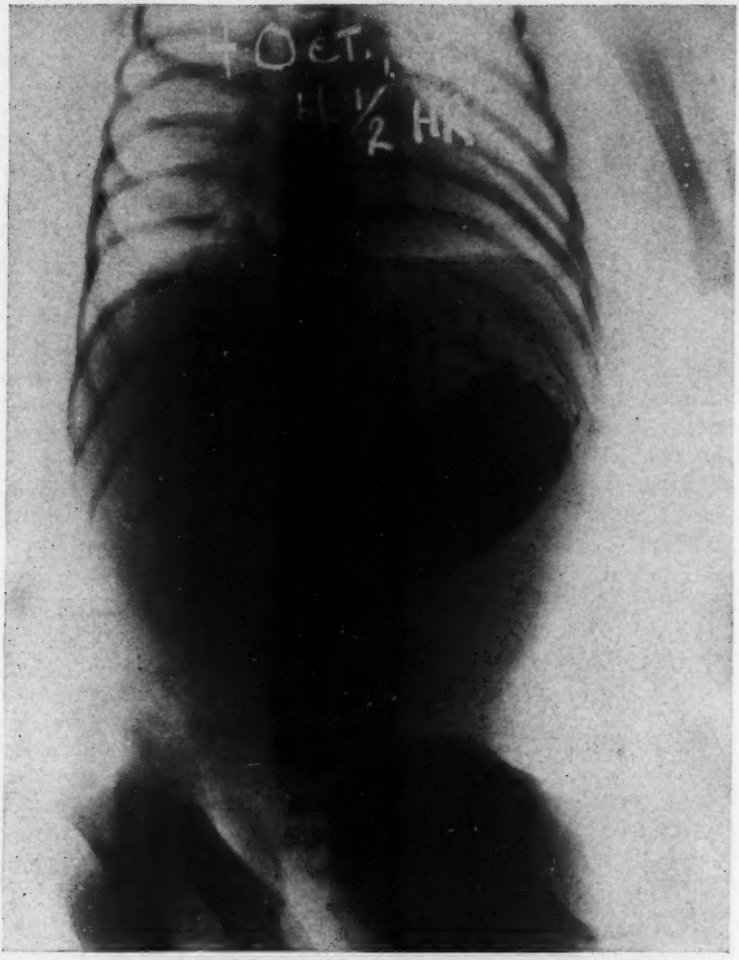

Figure 2.—Preoperative roentgenogram taken 4½ hours after instillation of lipiodol, showing no change from figure 1.

gallbladder was distended and somewhat tense, it was no larger than a kidney bean. In the region of the distal half of the pylorus and the first portion of the duodenum, the normal soft texture of the structure was replaced by a firm, fibrous cord about 5 millimeters in diameter and freely moveable. The roentgenographic diagnosis of congenital atresia of the first portion of the duodenum was thus confirmed. Although the biliary system was viewed with some suspicion, the tract

from the papilla of Vater to the anus was obviously patent because the meconium stools had contained bile. An isoperistaltic anterior gastrojejunostomy was accomplished using a continuous suture of 0000 plain catgut for the first layer and Lembert's interrupted seromuscular sutures of No. 80 cotton for the second layer of the anastomosis. The extremely small lumen of the jejunum contained bile but no gas. The patient was returned to her incubator and continuous oxygen in fair condition.

Repeated transfusions were given as required in the next 3 weeks. Fluid intake was maintained by parenteral administration of a 2.5 percent glucose, 2.5 percent protein hydrolyzate solution. Penicillin, streptomycin, and vitamin K were given intramuscularly. On the second postoperative day fine atelectatic rales were heard at the left base posteriorly. These rales cleared in about 3 days. Gavage of 10 cc. of 5 percent glucose solution every 3 hours was started 72 hours postoperatively. At this time the jaundice began to clear. Gavage was gradually increased to 45 cc. every 3 hours. For the next 7 days the baby passed small amounts of meconium stool several times a day. On the ninth postoperative day evaporated milk was added to the feedings and on the following day the stools contained normal milk curds. Oxygen was discontinued on the tenth day. Her weight was 4 pounds, 4½ ounces on the thirteenth postoperative day and she was retaining 45 cc. of a formula of 1 part evaporated milk and 2 parts water, every 3 hours by gavage. The stools had become normal and the jaundice had cleared completely. Daily parenteral fluids up to the twenty-first postoperative day, to maintain adequate hydration, were given. Bottle feedings by nipple, supplemented by vitamins and iron, were started on the twenty-third postoperative day. Weight gain was slow but steady, averaging about 1 ounce a day in the last 3 weeks of hospitalization. The patient was discharged from the hospital on her fiftieth postoperative day, at 2 months of age, weighing 6 pounds, and taking 4 ounces of formula every 4 hours. Roentgenograms were taken on the day of discharge (figs. 3 and 4). The contrast medium passed readily into the jejunum.

When examined on 7 March 1950 the baby was 5½ months old and weighed 12 pounds, 9 ounces. She was developing normally and was eating cereal, vegetables, and fruit, in addition to 32 ounces of formula (equal parts of water and evaporated milk, without sugar) daily. She had had no vomiting, diarrhea, or jaundice since discharge from the hospital. She did not sit up or crawl at this time but did appear well nourished. Further examination was essentially negative except for a flexion deformity of both thumbs. At the age of 6 months she was still doing well.

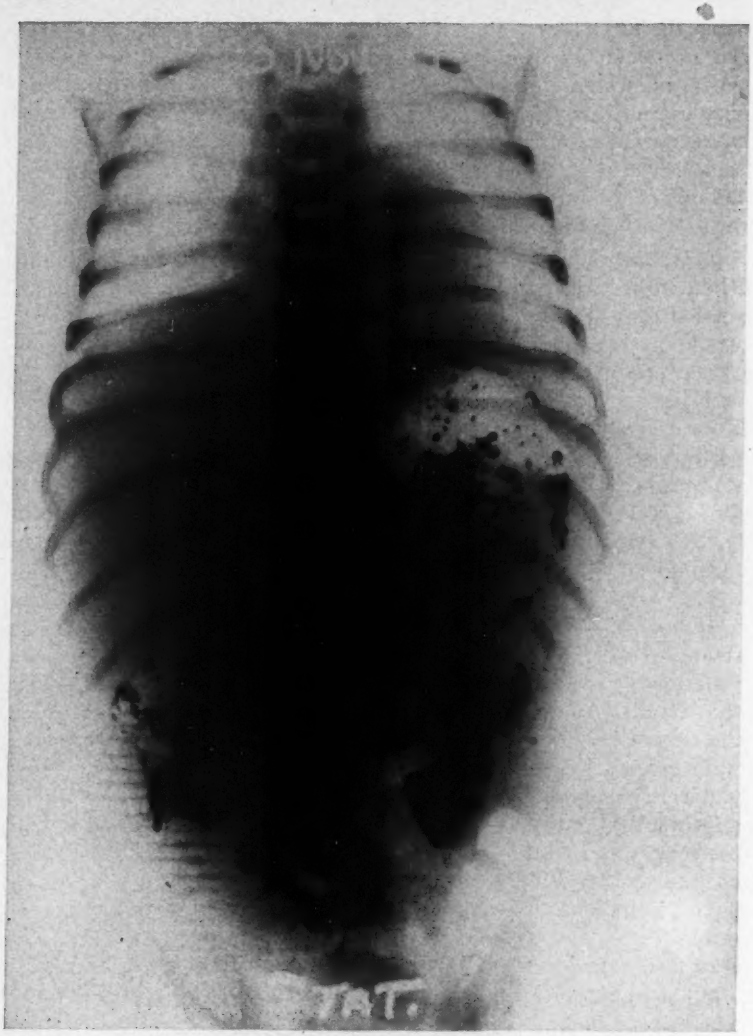

Figure 3.—Postoperative roentgenogram taken 15 minutes after instillation of 10 cc. lipiodol.

SUMMARY

The presentation of this case adds one more 6-month survival to the small but slowly growing list of successful cases of surgical treatment of duodenal atresia. In spite of such adverse factors as prematurity and delay in surgical treatment, the condition is not hope-

Figure 4.—Postoperative roentgenogram taken 1 hour after instillation of lipiodol showing normal motility and gastric emptying.

less, provided suitable preoperative care is instituted promptly and provided other more serious defects are not present. Early recognition and proper preparation for operation will enhance the successful outcome in this serious surgical condition.

Moth Ball Poisoning[1]

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ARVIN T. HENDERSON, *Lieutenant, MC, U. S. N.*

IN 1949, Zuelzer and Apt [2] reported four Negro toddlers with acute hemolytic anemia which followed the ingestion of naphthalene moth balls. Experimentally they were able to reproduce similar blood changes in dogs by administering naphthalene. They stated that no cases were reported in the American literature although they were able to cite several reports in foreign journals. We wish to record a case which presented similar clinical findings following naphthalene ingestion in a white child which we believe merits recording in order (1) that the syndrome may become more familiar, (2) to establish it more firmly as a clinical entity, and (3) to show that susceptibility is not limited to Negro children (as is sickle cell anemia, a possibility suggested by the fact that Zuelzer and Apt's report described incidence only in Negro children).

CASE REPORT

A white boy, 2 years and 9 months old, was well until 2 weeks prior to admission when he had a mild upper respiratory infection which responded to aspirin and nose drops. Four days prior to admission he became anorexic refusing everything but liquids, and became progressively more listless. Vomiting began 2 days later and was frequent. This was followed by fever and flushing of the face. On the morning of admission he passed a quantity of port wine-colored urine, and his mother noticed pallor and a yellow tint of his skin shortly thereafter.

Careful questioning of the mother failed to disclose ingestion of any known poisonous substances and he had never resided in a malarial region. When questioned specifically later about the child's contact with naphthalene moth balls, however, she stated that just prior to the onset of the child's indisposition she had found him playing with moth balls which she had discarded after preparing her winter garments for storage.

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[1] U. S. Naval Hospital, San Diego, Calif.

[2] ZUELZER, W. W., and APT, L.: Acute hemolytic anemia due to naphthalene poisoning. J. A. M. A. 141: 185–190, Sept. 17, 1949.

Physical examination revealed a well-nourished, apathetic, sallow boy who appeared seriously ill. His temperature was 101.2° F.; pulse 140; respirations 30; and blood pressure 90/60. His scleras and skin were moderately icteric and his mucous membranes were pale. The liver and spleen were palpable two fingerbreadths below the costal margins.

Admission laboratory findings are shown in table 1. The urine was a port wine color and scanty. Although the sediment was full of granular casts and cellular debris, no cells were seen. Roentgenograms of the skull, long bones, and chest were negative. Blood culture showed no growth.

TABLE 1.—*Laboratory findings on admission*

Red blood cells	1, 500, 000	Reticulocyte count	1. 8
White blood cells	19, 000	Icteric index	75
Hemoglobin (grams)	5	Bleeding time (minutes)	4
Segmented forms (percent)	51	Clotting time (minutes)	3½
Band forms (percent)	17	Total proteins	5. 2
Lymphocytes (percent)	26	A/G ratio	3:1
Eosinophils (percent)	3	Blood sugar	94
Basophils (percent)	3	Blood Kahn test	Negative
Platelet count	324, 000		

The tentative diagnosis was acute hemolytic anemia of Lederer. Treatment consisted of multiple transfusions and administration of sodium bicarbonate and penicillin.

The hemolytic process continued for a week in spite of repeated transfusions. The child was ready for discharge on the tenth hospital day and follow-up examination several weeks later showed him to be clinically well.

COMMENT

Although Lederer's anemia is a well-defined clinical syndrome, its cause is obscure. Respiratory and other types of infection have been blamed and isohemolysins have been demonstrated in the blood stream in some cases, suggesting that the hemolytic agent is the body's response to an unknown stimulus. Zuelzer's report on naphthalene poisoning sheds a new light on the cause of some of these cases. Our observations in this case lend weight to this belief. In spite of the fact that Zuelzer and Apt's four patients were all Negro children, the case here reported suggests that susceptibility to naphthalene is not confined to a single race and is not related to sickle cell anemia.

The findings were those of a seriously ill child with marked anemia and moderate jaundice who was passing port wine-colored urine and gave a history of a few days of anorexia, vomiting, and increasing lethargy. The hemolytic process continued from 3 to 7 days during

which time transfusions were necessary to replenish the rapidly hemolyzed erythrocytes. To prevent crystallization of hemoglobin in the kidney with subsequent anuria, Zuelzer advocated alkalinization by sodium bicarbonate or lactate. We were successful in keeping the urine alkaline by giving 0.6 gram of sodium bicarbonate every 4 hours. Recovery was apparently complete and this suggested that the syndrome was an acute poisoning. Further observations in the future will determine whether naphthalene poisoning is the most frequent cause of Lederer's anemia.

SUMMARY

A case of hemoglobinuria and hemolytic anemia following ingestion of moth balls is reported. Such findings preceded by lethargy, anorexia, vomiting, and fever in a child of the "poisoning age" should suggest to the clinician the possibility of naphthalene poisoning.

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Use of Field Dental Operating Set No. 60

LLOYD C. ENGLAND, *Captain, DC, A. U. S.*

THE Dental Operating Set, Field, No. 60 (item 9–180–100) furnished for use by the dental officer in the field is essentially and of necessity a kit containing only the bare necessities for exodontia. For this reason any complicated extractions should, in fairness to the patient and the dental officer, be referred to the nearest general hospital dental clinic where a more complete armamentarium and sometimes a specialist in exodontia is available. It is, therefore, necessary for the dental officer in the field to use more than a little surgical judgment in deciding which extractions he should attempt and which he should refer to the dental clinic. Because he does not have the advantage of an x-ray machine to warn him of hypercementosed or angulated roots and other hidden complications, he should be cautious in determining which extractions he should perform. This article is written in the hope that it may contain some hints on how to use the instruments at hand to the utmost advantage. It is my intention to describe certain operations that with slight variations may be adapted to the individual patient, using the instruments supplied in field set No. 60 (fig. 1).

Upper anterior teeth (cuspids and incisors) do not, as a rule, offer much of a problem unless the crown has been weakened by decay to such an extent that it breaks during the extraction and no part of the tooth protrudes sufficiently to permit the application of forceps. If this occurs it is best to try to displace the root with the No. 1 straight elevator by first placing it on the labial bone plate and forcing it up between the labial plate and the root and then on the mesial and distal bone plates, trying all the time to gain entrance into the socket using the bone as a fulcrum. In this way the root can usually be displaced. If such an attempt fails, a flap must be turned as follows: A vertical incision about 1 inch long is made in the mucous membrane at about the midpoint of the adjacent tooth. The soft tissues are retracted exposing the labial plate which is then removed using a sharp chisel and a mallet. Enough of the labial plate should be removed

Figure 1.—Top row, left to right: *Scalpel handle with blades; spatula (used as periosteal elevator); osseous chisel, Stout No. 2; mallet, plugging; mirror, mouth No. 4; scissors, crown, universal; syringe, hypodermic, cartridge type; scaler, No. 6; probe, abscess, silver; cross-cut fissure bur for straight handpiece; broach holder; blower, chip; sterile suture material.* Bottom row, left to right: *Forceps, tooth extracting No. 15; forceps, tooth extracting No. 16; forceps, tooth extracting No. 217; forceps, tooth extracting No. 210; forceps, tooth extracting No. 150A; forceps, tooth extracting No. 65; elevator, Winter No. 122; elevator, Winter No. 123; elevator, Winter No. 135; elevator, root, Stout A.*

Figure 2.—Broken down upper left central and lateral incisors. A flap operation aids in removal of this type.

Figure 3.—Soft tissues turned back and the labial bone plate removed.

Figure 4.—Soft tissues held in place with one silk suture.

so that application of the beaks of the No. 150 forceps can be made and the root withdrawn from the socket (figs. 2 and 3). A rotating motion will usually dislodge central and lateral roots, whereas, the cuspid root must be removed by a labial-palatal motion. Any sharp spicules of bone can be filed down using the Sheldon No. 11 bone file found in the kit. The soft tissue flap is held in place with one suture in the corner of the turned back portion (fig. 4).

Upper bicuspids.—The extraction of the upper first bicuspid teeth offers one of the most common problems encountered by the dental officer in the field. Very often an upper first bicuspid that is being extracted breaks at the point of bifurcation leaving two inaccessible root tips in the maxilla. This is the best time to refer the patient to a hospital dental clinic unless the operator has had wide experience with this problem. No attempt should be made to remove such roots with the straight elevator unless a roentgenogram is available showing the relation of such roots to the antrum of Highmore. It is a simple matter to push one of these roots into the antrum and often, if the antrum comes quite far anteriorly, the roots are already protruding into it within the bony sockets just waiting, so to speak, for the unwary operator to push them through the thin separating layer of bone. If the roots happen to be quite loose, they can sometimes be removed by inserting a root canal file into the canals and screwing it in until it is firm enough to withdraw the root tip. Usually, however, a flap must be made similar to the one described above and the overlying bony plate removed exposing the buccal root. This can usually be teased out with the straight elevator being careful not to exert any upward pressure on the root itself. After removal of the buccal root the bony septum is pierced using the straight elevator so that the instrument may be forced beneath the palatal root dislodging it. The socket should then be cleaned of any debris and the flap sutured back in place. Upper second bicuspids are usually single rooted and are not so troublesome. If caries is present on the buccal surface of either tooth, the beaks of the forceps should be forced above the caries and a greater buccal pressure used in the extraction.

Upper molars.—The field set No. 60 contains two forceps which can be used for upper molars, the No. 210 and the No. 150A. In most cases one or the other is adequate unless the molar happens to have

more than average root resistance. Upper first and second molars are likely to have a wide spread of roots. If so, it may be impossible to remove such a tooth with either of these forceps unless some method is first used to lessen the resistance around the roots. Because it is unwise to use a bone drill in the maxilla without first obtaining an intraoral roentgenogram to determine the lower limits of the maxillary sinus, the following operation is suggested: A generous flap is turned back exposing the buccal plate opposite the tooth to be extracted. Then using the osseous chisel No. 2 and a mallet, remove the buccal plate and expose about half the length of the buccal roots. After weakening the surrounding bone in this fashion, the tooth can usually be extracted with the forceps No. 210. Upper third molars usually have a smaller root surface than the first or second molars and can be taken with the forceps No. 210. The removal of impacted or unerupted upper third molars is elective and should, therefore, not be undertaken in the field.

Lower anterior and bicuspid teeth.—In removing any of the lower anterior or bicuspids roots when the crown has broken, a flap should be turned back exposing the labial plate. Then with a No. 557 (or similar) bur in a straight handpiece, a small hole can be drilled through the labial plate and into the root. By inserting the elevator No. 135 and prying downward, the root can usually be elevated from the socket.

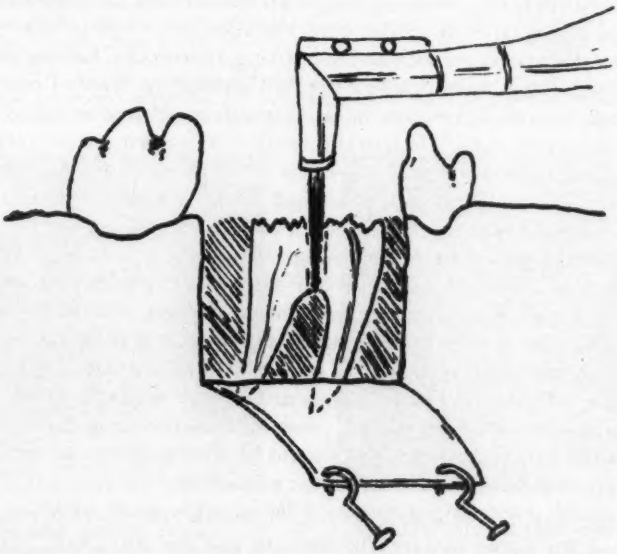

Figure 5.—Use of fissure bur to separate lower first molar roots.

Lower molars.—First and second lower molars offer a more difficult problem. If the crown has been partially destroyed by caries, the forceps No. 16 may be inadequate. In such cases the mesial root should be separated from the distal roots. A No. 557 bur in the angle handpiece is used to make a small slot running in a buccal-lingual direction between the roots (fig. 5) then using the No. 122 Winter elevator the mesial root is removed. By inserting the No. 123 Winter elevator into the mesial socket and first gouging out the bony septum the distal root can be elevated from its socket. After surgical removal

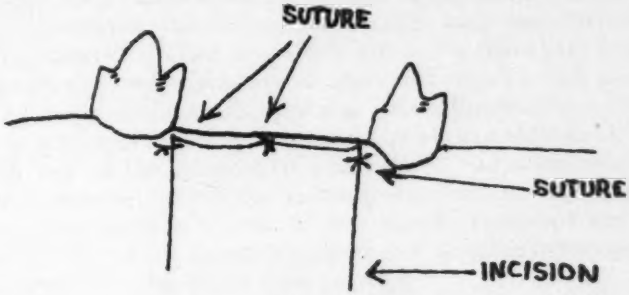

Figure 6.—Flap sutured in place.

of a lower tooth, more care must be given to removing bony spicules and debris from the socket than with extraction of an upper tooth. Also, gingival flaps must be sutured back in most flap operations on the lower jaw (fig. 6) whereas, gravity is sometimes sufficient to hold an upper flap in place with the help of a gauze pressure pack. If a small flask of sterile water is kept on hand, it can be used in the Moffat syringe now and then during an operation to clear the field of dried blood and debris and thus to increase visibility. It can, also be used after an operation to remove debris from the socket.

A Convenient Electric Current for the Nasopharyngoscope

KENNETH SOMERS, *Lieutenant Colonel, MC, U. S. A.*[1]

HOLMES,[2] in 1911, described his nasopharyngoscope which was equipped with a prismatic lens and which afforded a view of any field that could be brought to a right angle to the long axis of the instrument. In this and another article,[3] he stated that he was able to view the whole nasopharynx, upper surface of the soft palate, lumen of the eustachian tube, pretubal space, Rosenmüller's fossa, posterior portion of the septum, posterior tips of the middle and lower conchae, face of the sphenoid, middle meatus, and sometimes the sphenoidal sinus ostium and the maxillary sinus ostium. Since these articles, little has been written on the nasopharyngoscope and no mention is made of the nasopharyngoscope or nasopharyngoscopy in a recent book on the history of otolaryngology.[4]

Besides the visible anatomic locations enumerated above, Scholz[5] mentioned viewing the septum, olfactory fissure, ostia of the ethmoid cells, superior concha, superior meatus, hiatus semilunaris, bulla ethmoidalis, inferior meatus, and ostium of the nasolacrimal duct. In addition, he stated, "Almost every recess of the nose can be inspected by the rhinoscope during application of negative pressure."

In 1945, Hendricks[6] described a technic for taking photographs through the nasopharyngoscope. Following the article, by Crowe and Baylor,[7] on the prevention of deafness by irradiation of the nasopharynx, great impetus was given to the use of the nasopharyngoscope. In the Armed Forces, in the early part of World War II, the

[1] Fitzsimons Army Hospital, Denver, Colo.

[2] HOLMES, E. M.: Examination and treatment of nasopharynx and eustachian tube by aid of nasopharyngoscope. Ann. Otol., Rhin. & Laryng. 20: 29–40, Jan. 1911.

[3] HOLMES, E. M.: Rhinoscopy. Ann. Otol., Rhin. & Laryng. 27: 179–186, Mar. 1918.

[4] STEVENSON, R. S., and GUTHRIE, D. J.: History of Oto-laryngology. E. & S. Livingstone, Edinburgh, England, 1949.

[5] SCHOLZ, R. P.: Nasopharyngoscopy under negative pressure. Ann. Otol., Rhin. & Laryng. 33: 151–161, Mar. 1924.

[6] HENDRICKS, J. E.: Photography through nasopharyngoscope. Ann. Otol., Rhin. & Laryng. 54: 797–800, Dec. 1945.

[7] CROWE, S. J., and BAYLOR, J. W.: Prevention of deafness. J. A. M. A. 112: 585–590, Feb. 18, 1939.

employment of the scope was further accelerated by the use of irradiation for the prevention of aerotitis in aviators and barotrauma in Navy personnel. At present the exact role of nasopharyngeal irradiation is controversial, but this uncertainty emphasizes the need for extensive studies on this subject.

The nasopharyngoscope has been a standard medical supply item for a number of years. A factor which frequently limits its use is an inadequate supply of electric bulbs. The most common practice for lighting the instrument is to plug the lead wires into a two-cell battery handle which is ordinarily used for lighting ophthalmoscopes and otoscopes. The small light bulbs require only a minimum of current and if the rheostat on the battery handle is turned a little too high the invariable result is a burned-out bulb. The bulbs are expensive and medical supply officers usually carry only a small reserve supply. It, therefore, frequently happens that a working bulb becomes an item of curiosity. Taping the rheostat on the battery handle to a fixed position is helpful but tape is easily removed and generally not replaced when the battery handle is used for another purpose.

I have recently devised a simple means of preventing premature burning out of the bulbs. The small pocket flashlight which uses two pencil-sized batteries gives the proper amount of light and will not burn out the bulb. This pocket flashlight can be altered to fit the Holmes nasopharyngoscope in about 5 minutes (fig. 1). The bulb is

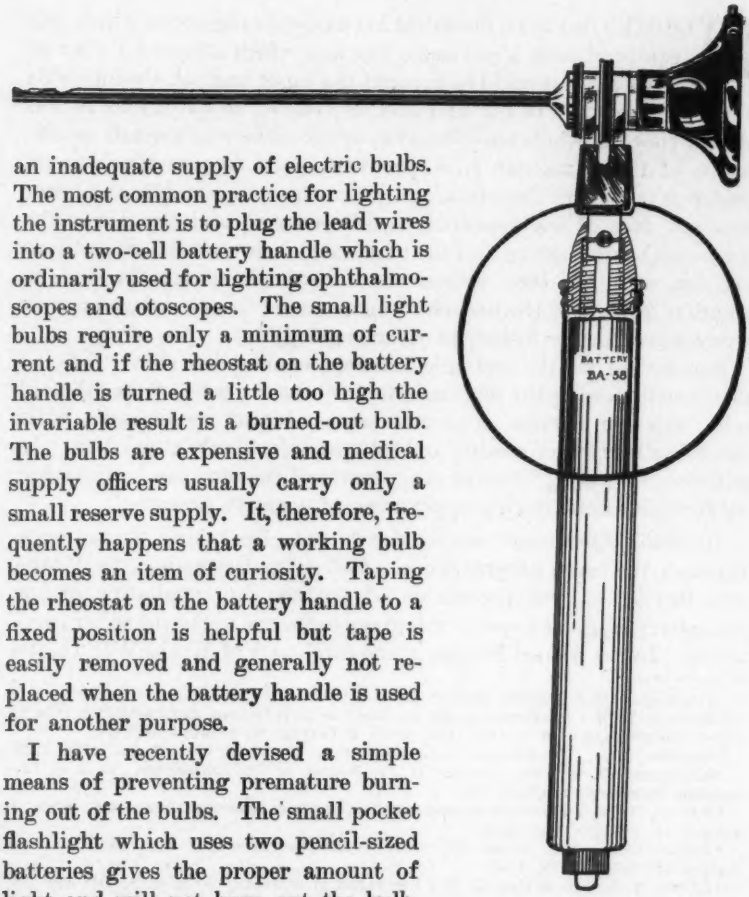

Figure 1.—Drawing of nasopharyngoscope attached to small flashlight. Area in circle shows a cross-sectional view of the connection.

removed from the flashlight and the aperture in the end of the flashlight through which the point of the bulb protruded is enlarged so as to admit exactly the bakelite collar around the contact post of the scope. The spring wire of the flashlight is bent to a smaller diameter so that it makes electrical connection with the contact post of the scope. A double-purpose switch is at the bottom of the flashlight so that the bulb can be lit intermittently by finger

Figure 2.—The nasopharyngoscope in actual use.

pressure or the handle can be set for prolonged lighting by turning a knurled button. The scope can be instantly disassembled from the battery handle by a slight pull on the scope, or reassembled by reversing the procedure.

The scope is easier to use when connected to this small flashlight than with the usual arrangement of wires and attached battery handle. Figure 2 shows the scope in actual use. Prior to the use of the previously described adaption several bulbs burned out each month. This is not surprising when it is considered that the scope was used by consultants, staff officers, residents, temporary trainees, and interns and was assembled for use by nurses and chair assistants. Since the use of the flashlight attachment, one bulb has been in continual use for over 8 months.

Dermatitis Caused by Japanese Lacquer

RICHARD L. ETTER, *Major, MC, U. S. A.*

IT IS my purpose to report an outbreak of dermatitis venenata caused by sensitivity to *Rhus vernicifera* in Japanese lacquer among officers of an Infantry Division in occupied Japan. Poison ivy, long recognized in the United States, was first mentioned by Capt. John Smith who wrote in a letter to England in 1609:

"The poisonous weed, being in shape but little different from our English yvie; but being touched causeth reddness, itchings, and lastly blysters, the which however, after a while they passe awaye of themselves without further harme; yet because for the time they are somewhat painefull, and in aspect dangerous, it hath gotten itselfe an ill name, although questionlesse of noe very ill nature."[1]

Rhus vernicifera sensitivity is rare in the United States and difficult to diagnose. It is common in the Orient, but because our medical officers are unfamiliar with it and its association with lacquer dermatitis they often do not recognize it. The amount of disability it causes justifies bringing it to the attention of medical officers.

A clearing station operating as a division hospital at Kumagaya, Honshu, Japan, at one time admitted seven officers with a severe contact dermatitis diagnosed as poison ivy, each presenting typical lesions on the forearms, hands, and face. Examination of the special troop dispensary records showed that at the same time five other officers were being treated on an ambulatory basis for similar lesions. Because none of the patients involved were enlisted men of the division, vegetation as a contact agent was at the time ruled out. Careful investigation of the habits, quarters, working conditions, and haunts of the affected personnel showed that they had nothing in common except regular evening visits to the division officers' club. Inspection of the club revealed nothing unusual except a bar which had been recently lac-

[1] MCNAIR, J. B.: Rhus Dermatitis from Rhus Toxicodendron, Radicans and Diversiloba (Poison Ivy) Its Pathology and Chemotherapy. University of Chicago Press, Chicago, Ill., 1923.

quered. A small scraping of the lacquered wood and a like piece of the unlacquered wood were obtained and a direct patch test was made on a known poison ivy sensitive member of the command. A violent skin reaction to the patch containing the lacquered wood occurred. The unlacquered piece gave a negative reaction. Patch testing with 10 percent urushi lacquer gave a reaction similar to that from the lacquered wood. Within 1 to 2 weeks all of the patients responded to treatment with either calamine lotion, boric acid compresses, Burow's solution, or a combination of these.

Through personal communication with a teacher of biology of the secondary school of Kumagaya it was learned that urushi lacquer was highly sensitizing and he recommended that it be air dried for 2 years before use. It is obtained from urushiol, the active principal of *Rhus vernicifera* which is very similar to our *Rhus toxicodendron*.[2] The urushi lacquer used on the bar was considered the best lacquer made in Japan. Hill et al.[3] and Toyama [4] showed that the active principal of *Rhus vernicifera* and *Rhus toxicodendron* was hydroxyl urushiol. Williams [5] has reported the use of intramuscular and oral *Rhus toxicodendron* antigen with some relief in 24 hours on a patient with lacquer dermatitis who did not respond to soothing lotions or salves. No antigen was used on the officers mentioned previously.

Several patients with *Rhus vernicifera* dermatitis have been reported according to Toyama [4] who also stated that dermatitis caused by the Japanese lacquer tree has been recognized in Japan and China for more than 1,000 years. He and his associates produced the dermatitis with lacquer taken from an antique jar which had been buried in a Japanese ruin for about 1,000 years. In 1924 Levin,[6] Zeisler,[7] and Highman [8] reported lacquer dermatitis in the United States from mah-jongg boxes received from the Orient. Hollander and Shelton [9] reported a like dermatitis from lacquered soup bowls that had been causing trouble intermittently for 15 years. Pusey [10] reported lacquer dermatitis from cheap cane flagpoles imported from Japan. Wil-

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[2] MUYAKASKI, M.: Plants natural color. Plates Publishing Company, 8th year of Showa.

[3] HILL; MATTACOTTI; and GRAHAM: The toxic principal of poison ivy. J. Am. Chem. Soc. 56: 2736, 1934.

[4] TOYAMA, I.: Poisonous elements of the Rhus vernicifera (Japanese lacquer tree) Rhus dermatitis. J. Cut. Dis. 36: 157, Mar. 1918.

[5] WILLIAMS, C. M.: Lacquer dermatitis treated with Rhus toxicodendron antigen. Arch. Dermat. & Syph. 12: 851–852, Dec. 1925.

[6] LEVIN, O. L.: Dermatitis venenata from lacquer on boxes of mah-jongg sets. J. A. M. A. 82: 465, Feb. 9, 1924.

[7] ZEISLER, E. P.: Dermatitis venenata from lacquer on boxes of mah-jongg sets. J. A. M. A. 82: 466, Feb. 9, 1924.

[8] HIGHMAN, W. J.: Dermatitis venepata caused by lacquer from mah-jongg set. Med. Times 52: 25, Feb. 1924.

[9] HOLLANDER, L., and SHELTON, J. M.: Dermatitis due to Japanese lacquer; report of case of involvement of 15 years duration. Arch. Dermat. & Syph. 36: 1081–1083, Nov. 1937.

[10] PUSEY, W. A.: Lacquer dermatitis. Arch. Dermat. & Syph. 7: 91–92, Jan. 1923.

liams [5] reported a similar reaction to a lacquered bracelet, and Little [11] observed several patients with lacquer dermatitis in China caused by the famous Ningpo varnish, the Chinese counterpart of the Japanese urushi lacquer used on floors, windows, and woodwork.

DISCUSSION

Because of the number of American personnel in the Orient it is important to keep in mind that, in a single case or outbreak of cases of contact dermatitis resembling poison ivy dermatitis, lacquer from the Japanese *Rhus* may be the cause. Although there are six poisonous species of poison ivy in Eastern Asia the Oriental *Rhus vernicifera* is predominant and is the one used exclusively in art lacquer ware.[4] These patients illustrated the fact that there is a great similarity in the dermatitis-producing qualities of the oriental *Rhus vernicifera* and our *Rhus toxicodendron*, both being capable of producing severe toxic symptoms. In addition to the direct contact with the plant, *Rhus vernicifera* is an ingredient of the lacquer used to make innumerable art and souvenir objects, all of which are potential sensitizers. Persons sensitive to any of the related North American plants are potentially sensitive to the oriental *Rhus vernicifera* and the lacquer derived from it. Shelmire [12] has shown that the irritative and dermatitis-producing properties of the fresh saps and the ether extracted oleoresins of the various species of poison ivy and poison sumac are biologically identical, and that the dermatitis-producing fraction of the ivy sap deteriorates slowly, if at all, in the presence of air.

[11] LITTLE, C.: Dermatitis produced by Chinese lacquer. Brit. M. J. 1: 1112, June 21, 1924.

[12] SHELMIRE, B.: Poison ivy plant and its oleoresin. J. Invest. Dermat. 4: 337–348, Oct. 1941.

Portuguese Man-of-War Sting

WARREN E. KLEIN, *Captain, MC, U. S. N.*[1]
ROBERT H. BRADSHAW, *Commander, MC, U. S. N.*[1]

PERSONS swimming in tropical waters are not infrequently stung by a variety of marine animals, coelenterates being the most common agents. These organisms are found either as free-swimming jellyfish (medusae) or as sessile polyps. Sessile polyps resemble plants as they have stalked bodies and flowerlike crowns of tentacles. The tentacles of both forms bear numerous small stinging structures called nematocysts which contain barbs. When a tentacle comes in contact with any organism each nematocyst discharges a small barb and a minute quantity of toxin into the victim's skin. The severity of the reaction to such attack depends primarily on the number of stings sustained and the type of toxin injected. Reactions vary from mild local skin irritation to profound systemic reactions.

CLINICAL CHARACTERISTICS

The Portuguese man-of-war is a large colonial coelenterate which floats by means of a brightly colored air bladder. The stringlike tentacles of this assemblage of organisms stretch for several yards around it. These jellyfish often are found together in large numbers being brought close to shore in certain seasons by storms or varying ocean currents. A person coming in contact with a tentacle immediately receives many sharp stings, and the exposed part quickly shows erythematous streaks or patches where contact is made with individual nematocysts. Pain, swelling, and redness occur in the affected part. Systemic effects, following severe stings, appear in from a few minutes to an hour and include anxiety, muscular pains and cramps, dyspnea, constriction of the throat, cardiac weakness, and prostration.

CASE REPORT

A 20-year-old white man was swimming on 30 April 1950 about 20 feet off North Miami Beach when his attention was drawn to a purple

[1] U. S. Naval Air Station Dispensary, Key West, Fla.

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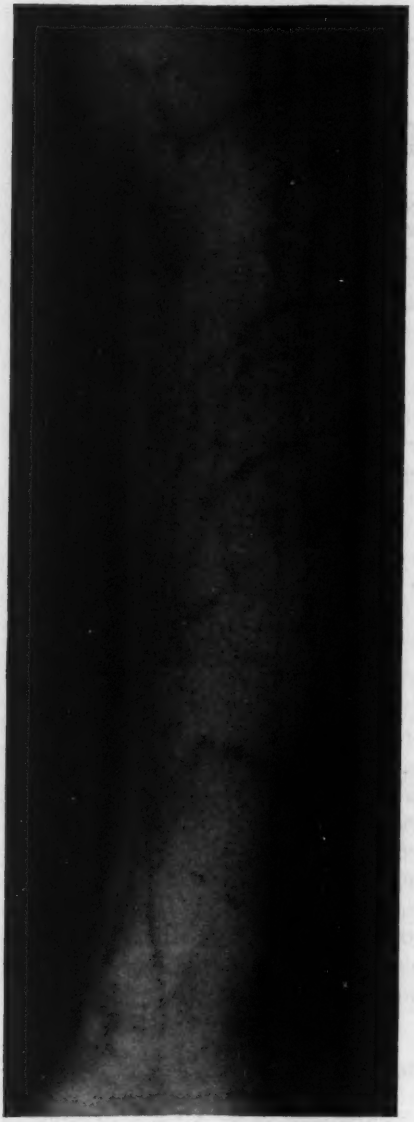

Figure 1.

object floating about 15 feet from his position in the water. Thinking it was a balloon, he swam up and touched it. He was immediately aware of a sharp painful stinging sensation on his right forearm and right scapular region. Looking at his arm he noted six or eight strands which he could not brush off. He left the water immediately and a companion removed the adherent strands by means of a towel. Each strand, when removed, left a painful fiery red welt. In a few moments he experienced difficulty in breathing and was seized with severe abdominal cramps. He was removed to the St. Francis Hospital, Miami, Fla. where he showed signs of mental confusion and shock. He was given 10 cc. of calcium gluconate intravenously, 4 cc. of benadryl intravenously and 2 cc. intramuscularly, 1 cc. of epinephrine in 2 doses intramuscularly, 0.4 mg. of atropine intramuscularly, and ammonia was applied locally.

The patient returned to his station and was seen on 1 May at this dispensary at which time he presented the picture portrayed in figures 1 and 2. In addition to the lesions as shown, there was slight swelling of the right hand, with numbness and stiffness of the joints of the fingers. There were no unusual systemic signs or symptoms but there was moderate itching

of the affected areas. The temperature, pulse, respiration, and blood pressure were all within normal limits. The itching areas were treated with tetracaine ointment and the patient was sent to duty. On 3 May the lesions were slightly less inflamed and there was no itching, swelling, or numbness. Nineteen days were required for fading of the lesions in the right scapular area and 24 days for the lesions on the right arm. At the end of these periods a faint white hairlike scar was all that remained of the original lesions.

Figure 2.

CONCLUSIONS

The violence and rapidity of onset of the symptoms following coelenterate stings would lead one to believe that a powerful neurotoxin was injected. Many persons have experienced the sting of the Portuguese man-of-war, and innumerable swimmers have made unpleasant contact with sessile polyps and with live coral, reporting severe local pain and, at times, markedly delayed fading of the resulting erythematous mark. The involved area may be cool to the

touch, suggesting local vasomotor reaction. This reaction may persist for periods up to several weeks.

The method of removal of the tentacles employed in this case was ideal and is strongly recommended, as attempts to brush the tentacles away will only lead to further stings and possibly to extensive, confluent lesions which may break down and become resistant to treatment. The emergency measures employed in this case were effective and adequate. Local application of analgesic ointment is recommended.

About the Army Medical Service

Officer Personnel Procurement in the Army Medical Service[1]

PAUL I. ROBINSON, *Brigadier General, MC, U. S. A.*[2]

AS SPECIALIZATION progresses, the concept of the medical team becomes more and more important. No longer can we formulate staffing tables for the Medical Corps alone, nor for the Nurse Corps, the Medical Service Corps, or the Women's Medical Specialist Corps. Neither can we effect intelligent assignments against these staffing tables until we study each officer as an individual. Reasons for this necessity can be illustrated by mention of several fields; we have anesthetists in both the Medical Corps and the Army Nurse Corps; many of our command and staff positions are being shifted from Medical Corps to Medical Service Corps as the training and experience in the latter progress; food service functions are being shifted rapidly from officers of the Medical Service Corps to the Women's Medical Specialist Corps; many laboratory functions are now performed by those in the Allied Sciences Section of the Medical Service Corps. In general, these trends have resulted from the basic principle that a job should be accomplished by the least highly trained person who can perform it adequately. It naturally follows that such a job is done better because it represents the primary interest of the individual.

In procurement, however, the various Corps of the Medical Service present distinct and different problems. In the 3 years immediately preceding the hostilities in Korea, we had been increasing the number of officers in the Medical Corps through our intern and residency programs in both military and civilian hospitals. Progress was phenomenal, in that we gained in these 3 years more physicians for the Regular Army than had been so commissioned in the previous 30 years. We were fortunate in being able to offer a medical officer's

[1] Presented by General Robinson to the Conference of Leaders of Professional Nursing on Long Range Planning for Procurement of Nurses for the Armed Forces, at Washington, D. C., on 5 January 1951.

[2] Chief, Personnel Division, Office of the Surgeon General, Department of the Army.

salary in addition to the prime desire of all young physicians; namely, postgraduate training, but we had no program which would produce the number of volunteer officers required to meet an emergency and the Korean outbreak emphasized that deficiency. The medical profession and the Congress quickly took the matter in hand and passed legislation to require service of physicians, dentists, and veterinarians. As a result of Public Law 779, 81st Congress, the veterinary officer requirements will be met by volunteers, and the dental officer requirements will probably be met by recalled Reserve officers. It seems possible, at this time, that medical officer requirements will not be met except by invoking the draft.

The chief reason for this is not lack of patriotism or a sense of responsibility on the part of the physicians of the nation. Continuation of postgraduate training is the chief desire of all young medical men, and they are willing to take a chance on anything to avoid interruption of their education. Postgraduate training also enters into the procurement problem in two of the three sections of the Women's Medical Specialist Corps.

Except for our allied scientists and others with special qualifications, Medical Service Corps procurement is being satisfactorily accomplished by involuntary recall of Reserve officers and by accepting volunteers.

Our Nurse Corps has traditionally been staffed with volunteers. The various nursing associations have always been quick to recognize our problems and to meet them promptly and directly. The state quota system, which they have used on more than one occasion, has been most impressive. We believe that our requirements are modest. Under the newest planning criteria, we require 3,500 nurses from civil life in this fiscal year. Of that number, 3,000 are needed at once. This requirement which has already been sent to the respective states will provide a peak of 7,845 nurses in uniform. The other 500 will be needed before the end of the fiscal year (30 June 1951).

Our professional nursing needs today are being provided by both military and civilian nurses, and no doubt we will always use a limited number of civilian nurses. Although it is not possible to use them on a one to one replacement basis for Army nurses, because of legal restrictions on their hours of employment and the fact that they may not be available for all the staffing periods because of family responsibilities, and other personal considerations, they have been an important source of assistance to us. We have, in planning our needs for the fiscal year, considered that we shall use the services of at least 655 civilian nurses, which is about the number now on duty with the Army.

Although our requirements may be considered low in comparison with those of civilians, we have long endeavored to train and use our enlisted technicians to assist our nurses in carrying out nonprofessional duties. We are fully cognizant of the movement in civil life to accomplish nursing service by means of nursing personnel with varying degrees of training. Through the efforts and contribution of nurses assigned to the management research functions in this office, studies are being conducted to determine the most effective and economical use of nursing personnel and the degree of training necessary to meet the various nursing situations which must be covered in military medical installations. We are ready to participate in any planning for the future and to lend our support to progressive studies in furtherance and improvement of medical and nursing care.

BOOKS RECEIVED

The Preparation of Photographic Prints for Medical Publication, by *Stanley J. McComb,* F. B. P. A., Section on Photography, Mayo Clinic, Rochester, Minn. 65 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $2.

Indications for and Results of Splenectomy, by *Frederick A. Coller,* M. D., *Alexander Blain, III,* M. D., and *Gould Andrews,* M. D., from The Departments of Surgery and Medicine, University of Michigan Medical School, Ann Arbor, Mich. 100 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $2.25.

Physiology of the Eye, Clinical Application, by *Francis Heed Adler,* M. A., M. D., F. A. C. S., William F. Norris and George E. de Schweinitz Professor of Ophthalmology, School of Medicine, University of Pennsylvania, and Consulting Surgeon, Wills Hospital, Philadelphia. 709 pages; with 319 illustrations, including 2 in color. The C. V. Mosby Co., St. Louis, Mo., publisher, 1950. Price $12.

Pharmacological Basis of Penicillin Therapy, by *Karl H. Beyer,* Ph. D., M. D., F. A. C. P., Director of Pharmacological Research, The Medical Research Division, Sharp and Dohme, Incorporated, Glenolden, Pa. Publication No. 77, American Lecture Series. 214 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $4.50.

Methods in Medicine, The Manual of the Medical Service of George Dock, M. D., Sc. D., Formerly Professor of Medicine, Washington University School of Medicine; Formerly Physician-in-Chief, Robert A. Barnes Hospital, St. Louis. A Comprehensive Outline for Clinical Investigation, Management, and Treatment of Patients with Various Medical Disorders, by *George R. Herrmann,* M. D., Ph. D., Professor of Medicine, University of Texas Medical Branch at Galveston; Director of the Cardiovascular Service and Heart Station, University of Texas Hospitals; Consultant in Medicine to the Surgeon General, U. S. Army; Consultant in Vascular Diseases to the Marine Hospital, U. S. P. H. S. 2d edition, completely revised. 488 pages. The C. V. Mosby Co., St. Louis, Mo., publisher, 1950. Price $7.50.

Injuries to the Ankle, by *J. Grant Bonnin,* M. B., B. S. (Melbourne); F. R. C. S. (England); Orthopaedic Surgeon, Central Middlesex Hospital; Late Orthopaedic Registrar, West London Hospital; Acting Registrar, Royal National Orthopaedic Hospital; Orthopaedic Surgeon, E. M. S., White Lodge Hospital; Lieutenant-Colonel, R. A. M. C.; Orthopaedic Adviser, South East Asia Command; Hunterian Professor, Royal College of Surgeons. 412 pages; illustrated. Grune & Stratton, New York, N. Y., publisher, 1950. Price $8.50.

Food Allergy, by *Herbert J. Rinkel,* M. D., F. A. C. P., F. A. C. A., F. A. A. A., formerly, Associate Instructor in Medicine, University of Oklahoma, School of Medicine; *Theron G. Randolph,* M. D., F. A. C. A., F. A. A. A., A. A. C. P., Instructor in Medicine, Northwestern University Medical School; and *Michael Zeller,* M. D., F. A. C. P., F. A. C. A., F. A. A. A., Clinical Instructor in Medicine, University of Illinois College of Medicine. 492 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $8.50.

The External Secretion of the Pancreas, by *J. Earl Thomas,* M. D., Professor of Physiology, Jefferson Medical College of Philadelphia, Philadelphia, Pa. Publication Number 45, American Lecture Series. 149 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $3.50.

Neurology and Psychiatry in General Practice, edited by *Henry R. Viets,* M. D., in collaboration with *C. Charles Burlingame,* M. D., *Clarence B. Farrar,* M. D., and *Z. M. Lebensohn,* M. D. 150 pages. Grune & Stratton, Inc., New York, N. Y., publisher, 1950. Price $3.50.

Diagnostic Procedures and Reagents, edited by *Ralph S. Muckenfuss,* M. D., Assistant Commissioner, New York City Health Department. Report prepared by the Subcommittee on Diagnostic Procedures and Reagents of the American Public Health Association. 3d edition. 589 pages; illustrated. American Public Health Association, Inc., 1790 Broadway, New York 19, N. Y., publishers, 1950. Price $6.

The 1950 Yearbook of General Surgery (July, 1949–June, 1950), edited by *Evarts A. Graham,* A. B., M. D., Professor of Surgery, Washington University School of Medicine; Surgeon-in-Chief of the Barnes Hospital and of the Children's Hospital, St. Louis; with a section on Anesthesia edited by *Stuart C. Cullen,* M. D., Professor of Surgery and Chairman of Division of Anesthesiology, State University of Iowa College of Medicine and Hospitals. 670 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., publishers, 1950. Price $5.

Toxaemias of Pregnancy, Human and Veterinary, A Ciba Foundation Symposium, edited by *John Hammond,* M. A., D. Sc., F. R. S., *F. J. Browne,* M. D., D. Sc., F. R. C. S., F. R. C. O. G., and *G. E. W. Wolstenholme,* O. B. E., M. B. 277 pages; 93 illustrations. The Blakiston Co., Philadelphia, Pa., publishers, 1950. Price $4.50.

Study Guide Testbook in Anatomy and Physiology, by *Carolyn E. Gray,* M. A., R. N., *Caroline E. Stackpole,* M. A., Associate in Biology, Teachers College, Columbia University, and *Lutie C. Leavell,* M. A., M. S., R. N., Assistant Professor in Nursing Education, Teachers College, Columbia University. Based on the Textbook of Anatomy and Physiology, Twelfth Edition by Diana C. Kimber, Carolyn, E. Gray. Revised by Caroline E. Stackpole, Lutie C. Leavell. 6th edition. 107 pages; illustrated. The Macmillan Company, New York, N. Y., publisher, 1950. Price $1.50

Pars Pro Toto, Abbreviations in International Medical Literature Including Sister Sciences In Six Languages, by *Alfred Peyser.* 196 pages. Almqvist & Wiksell, Stockholm, Sweden, publisher, 1950. Price 12 kr. (about $2.33).

The 1950 Year Book of Drug Therapy (October 1949–September 1950), edited by *Harry Beckman,* M. D., Director, Department of Pharmacology, Marquette University School of Medicine. 566 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., publishers, 1950. Price $5.

1950 Year Book of Dentistry (August 1949–August 1950), edited by *Stanley D. Tylman,* D. D. S., M. S., Professor and Head of the Department of Prosthetics, University of Illinois College of Dentistry, Chicago, Ill., *Donald A. Keys,* D. D. S., Professor and Chairman of the Department of Operative Dentistry, College of Dentistry, University of Nebraska, Lincoln, Nebr., *John W. Knutson,* D. D. S., Dr. P. H., Dental Director, Chief of the Division of Dental Public Health, Public Health Service, Washington, D. C., *George R. Moore,* D. D. S., M. S., Professor and Head of the Department of Orthodontics, School of Dentistry, University of Michigan, Ann Arbor, Mich., *Hamilton G. B. Robinson,* D. D. S., Director, Post-Graduate Division, College of Dentistry, Ohio State University, Columbus, Ohio, and *Carl W. Waldron,* M. D., D. D. S., Clinical Professor of Oral Surgery, University of Minnesota, School of Dentistry, Minneapolis, Minn. 525 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., publisher, 1950. Price $5.

Fainting, Physiological and Psychological Considerations, by *George L. Engel,* M. D., Associate Professor of Medicine and Psychiatry, The University of Rochester School of Medicine and Dentistry, Rochester, N. Y. Publication Number 37, American Lecture Series. 141 pages. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price, $2.75.

Psychosomatics and Suggestion Therapy in Dentistry, by *Jacob Stolzenberg,* D. D. S. 152 pages; illustrated. Philosophical Library, New York, N. Y., publisher, 1950. Price $3.75.

Recent Advances in Nutrition, with Particular Reference to Protein Metabolism, by *Paul R. Cannon,* Ph. D., M. D., Chairman of the Department of Pathology, University of Chicago; in collaboration with *Earl P. Benditt,* M. D., *Laurence E. Frazier,* M. A., *Eleanor M. Humphreys,* M. D., *Harold C. Steffee,* M. D., Ph. D., *Robert W. Wissler,* M. D., Ph. D., and *Robert Woolridge,* M. A. Porter Lectures, Series 14. 74 pages; illustrated. University of Kansas Press, Lawrence, Kans., publisher, 1950. Price $2.

Physiology of Shock, by *Carl J. Wiggers,* M. D., Sc. D., F. A. C. P., Professor of Physiology and Director, Department of Physiology, School of Medicine, Western Reserve University. 458 pages; illustrated. The Commonwealth Fund, New York, N. Y., publisher, 1950. Price $5.

Illustrations of Bandaging and First Aid, Compiled by *Lois Oakes,* S. R. N., D. N. (Leeds and London), Formerly Nursing Editor, Nursing Illustrated; Late Sister-Tutor, Walton Hospital, Liverpool; Nursing Technical Officer to Ministry of Labour, Eastern Region, Examiner to the General Nursing Council. 4th edition. 307 pages; illustrated with 370 photographs. The Williams and Wilkins Co., Baltimore, Md., publisher, 1950. Price $2.

Pulmonary Ventilation and Its Physiological Regulation, by *John S. Gray,* M. D., Ph. D., Professor of Physiology, Northwestern University Medical School, Chicago, Ill. Publication Number 63, American Lecture Series. 82 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $2.

"Your Prostate Gland," Letters from a Surgeon to His Father, by *Reed M. Nesbit,* M. D., Professor of Surgery, University of Michigan Medical School, Chief, Section on Urology, University Hospital, Ann Arbor, Mich. 50 pages; illustrations by *Janet McLaughlin.* Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $2.

The Normal Encephalogram, by *Leo M. Davidoff,* M. D., Director of Neurological Surgery, Beth Israel Hospital, New York City; Clinical Professor of Neurosurgery, New York University Postgraduate Medical School, and *Cornelius G. Dyke,* M. D., Late Associate Professor of Radiology in the College of Physicians and Surgeons, Columbia University; Late Director, in the Department of Radiology of the Neurological Institute of New York, New York City. 3d edition, thoroughly revised by *Leo M. Davidoff,* M. D. 240 pages; 190 illustrations on 156 figures. Lea & Febiger, Philadelphia, Pa., publisher, 1951. Price $6.

The Dispensatory of the United States of America, by *Arthur Osol,* Ph. G., M. S., Ph. D., Professor of Chemistry and Director of the Department of Chemistry, Philadelphia College of Pharmacy and Science; Member of the Committee of Revision of the United States Pharmacopeia, and *George E. Farrar, Jr.,* M. D., F. A. C. P., Associate Professor of Medicine, School of Medicine, Temple University; Member of the Committee of Revision of the United States Pharmacopeia; With *E. Emerson Leuallen,* M. Sc., D. Sc., Professor of Pharmacy and Chairman of the Department of Pharmacy, Columbia University College of Pharmacy; Pharmacy Editor, American Druggist; *Heber W. Youngken,* Ph. M., Ph. D., Sc. D., Professor of Pharmacognosy and Biology, Massachusetts College of Pharmacy; Member of the Committee of Revision of the United States Pharmacopeia; *Willard F. Verwey,* Sc. D., Director of Bacteriological Research, Medical Research Division, Sharp and Dohme, Inc.; and *David K. Detweiler,* V. M. D., M. S., Assistant Professor of Pharmacology, School of Veterinary Medicine, University of Pennsylvania. Advisory Editor, *Horatio C. Wood, Jr.,* M. D., Ph. M., Professor of Pharmacology, Philadelphia College of Pharmacy and Science. Complete in two volumes; Volume 1: Based on the Thirteenth Revision of The United States Pharmacopeia, The National Formulary, Eighth Edition, and The British Pharmacopeia, 1932, and its Addenda. Volume 2: Being a commentary on the new drugs introduced in the Fourteenth Revision of The United States Pharmacopeia, The National Formulary, Ninth Edition, The British Pharmacopeia, 1948, as well as the new drugs not officially recognized. 2.057 pages. J. B. Lippincott Co., Philadelphia, Pa., publisher, 1950. Price $25.

Periodontia, Clinical Pathology and Treatment of the Periodontal Tissues, by *Edgar D. Coolidge,* B. S., M. S., D. D. S., LL. D. (Hon. Loyola), Professor Emeritus of Therapeutics, Preventive Dentistry and Oral Hygiene, Chicago College of Dental Surgery, School of Dentistry, Loyola University, Chicago, Ill.; formerly Professor of Materia Medica, Pharmacology and Therapeutics of the School of Dentistry, University of Illinois; and *Maynard K. Hine,* M. S., D. D. S., Professor of Periodontia and Histopathology and Dean, Indiana University School of Dentistry; formerly Rockefeller Fellow in Dentistry and Carnegie Fellow in Dentistry, Rochester School of Medicine and Dentistry and Assistant Professor of Dental Pathology and Therapeutics School of Dentistry, University of Illinois, Chicago, Ill. 318 pages; 378 illustrations on 219 figures and 2 colored plates. Lea & Febiger, Philadelphia, Pa., publishers, 1951. Price $6.

Diseases of the Tropics, by *George Chcever Shattuck,* M. D., Professor of Tropical Medicine, Harvard Medical School and Harvard School of Public Health, Emeritus; Consultant for Tropical Diseases, Boston City Hospital, and Massachusetts General Hospital. 803 pages; illustrated. Appleton-Century-Crofts, Inc., New York, N. Y., publishers, 1951. Price $10.

An Illustrated Study Aid for Medical Bacteriology, by *Walter J. Nungester,* Sc. D., M. D., and *Phebe G. Williams,* B. A., Department of Bacteriology, University of Michigan. 92 pages; illustrated. Distributed by Ulrich's, Ann Arbor, Mich., 1950. Price $2.50.

Diathermy, The Use of High Frequency Currents, by *Stafford L. Osborne,* B. P. E., M. S., Ph. D., Professor and Chairman, Department of Physical Medicine, Northwestern University Medical School. Publication Number 91, American Lecture Series. 113 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $3.

Movable-Removable Bridgework, A System of Physiologic Bridge Work Devised by Herman E. S. Chayes, D. D. S., by *John Oppie McCall,* D. D. S., F. A. C. D., F. A. A. P., Former Instructor of Periodontia, University of Buffalo; Former Instructor in Periodontia, Extension Courses, Columbia University; Former Professor of Periodontia, New York University; Former Director, the Murry and Leonie Guggenheim Dental Clinic, New York; Past President, American Academy Dental Clinic, New York; Past President, American Academy of Periodontology, and *Isadore M. Hugel,* D. D. S., Associate in practice and teaching with the late Herman E. S. Chayes; Former Instructor in Crown and Bridgework, New York University; Assistant Clinical Professor of Oral Surgery, New York University; Diplomate of the New York State Board of Oral Surgery; Member Omicron Kappa Upsilon; Member American Association of University Professors, with a chapter on The Physiologic Movement of Teeth by *Charles F. Bodecker,* D. D. S., F. A. C. D., Emeritus Professor of Dentistry (Histology), Columbia University College of Dental and Oral Surgery; Noted Researcher and Authority in Dental Histology. 221 pages; illustrated. Dental Items of Interest Publishing Co., Inc., Brooklyn, N. Y., 1950. Price $7.50.

Anatomy of the Nervous System, by *Olof Larsell,* M. A., Ph. D., Sc. D., Professor of Anatomy, University of Oregon Medical School, Portland. Introduction by *A. T. Rasmussen,* Ph. D. 2d edition. 520 pages; illustrated. Appleton-Century-Crofts, Inc., New York, N. Y., publishers, 1951. Price $9.

The 1950 Year Book of the Eye, Ear, Nose and Throat (November 1949–October 1950). The Eye, edited by *Derrick Vail,* M. D., D. Oph. (Oxon.), F. A. C. S., Professor and Director, Department of Ophthalmology, Northwestern University Medical School; Attending Ophthalmologist, Passavant Memorial Hospital and Cook County Hospital; Late Senior Consultant in Ophthalmology, E. T. O., U. S. A. The Ear, Nose and Throat, edited by *Samuel J. Crowe,* M. D., Professor of Otology, Rhinology and Laryngology, Johns Hopkins University, with the collaboration of *Elmer W. Hagens,* M. D., Assistant Professor of Otolaryngology, Northwestern University Medical School; Attending Staff, Wesley Memorial Hospital, Chicago. 446 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., publishers, 1950. Price $5.

Brain Metabolism and Cerebral Disorders, by *Harold E. Himwich,* M. D., Chief, Clinical Research Branch, Medical Division, Army Chemical Center, Maryland. 451 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., publishers, 1951. Price $6.

Friend of the People, The Life of Dr. Peter Fayssoux of Charleston, South Carolina, by *Chalmers G. Davidson.* 151 pages. Published by The Medical Association of South Carolina, 1950. Price $2.75.

Atlas of Histologic Diagnosis in Surgical Pathology, by *Karl T. Neubuerger,* M. D., Professor of Pathology, University of Colorado School of Medicine, Denver, Colo., with a section on Exfoliative Cytology by *Walter T. Wikle,* B. S., M. S., M. D., Assistant Professor of Pathology, University of Colorado School of Medicine, Denver, Colo. Photography by *Glenn E. Mills,* B. A., M. A., Department of Visual Education, University of Colorado School of Medicine, Denver, Colo. 460 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., publisher, 1951. Price $11.

The Use of Pedicle Flaps of Skin in Plastic Surgery of the Head and Neck, by *Gordon B. New,* M. D., F. A. C. S., Professor of Plastic Surgery, and *John B. Erich,* M. D., F. A. C. S., Associate Professor of Plastic Surgery, Both of Graduate School, University of Minnesota, Minneapolis, and Section on Laryngology, Oral and Plastic Surgery, Mayo Clinic, Rochester, Minn. Publication Number 56, American Lecture Series. 104 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $3.

Meat Hygiene, by *A. R. Miller,* D. V. M., LL. B., Chief of the Federal Meat Inspection Service, U. S. Department of Agriculture, Washington, D. C. 420 pages; illustrated. Lea & Febiger, Philadelphia, Pa., publishers, 1951. Price $7.50.

Fundamentals of Clinical Fluoroscopy, With Essentials of Roentgen Interpretation, by *Charles B. Storch,* M. D., Adjunct, Radiodiagnostic Department and Radiotherapy Department, Beth-El Hospital, Brooklyn, N. Y. 196 pages; illustrated. Grune & Stratton, New York, N. Y., publishers, 1951. Price $6.75.

Monographs on Surgery, 1951, edited by *B. Nolan Carter,* M. D., Ph. D. Professor of Surgery, University of Cincinnati, Director of the Surgical Services, Cincinnati General Hospital; Advisory Editors; Gynecology, *Joe V. Meigs,* M. D., Clinical Professor of Gynecology, Harvard University Medical School; Chief of the Vincent Memorial Hospital; Urology, *Charles Huggins,* M. D., Professor of Urology, the University of Chicago; Chairman of Committee on Cancer, the University of Chicago; Orthopedic Surgery, and *Alfred R. Shands,* M. D., Medical Director, Alfred I. duPont Institute of the Nemours Foundation. 508 pages; illustrated. Thomas Nelson & Sons, New York, N. Y., publishers, 1950. Price $12.50.

BOOK REVIEWS

Freud: Dictionary of Psychoanalysis, edited by *Nandor Fodor,* Associate of the Association for the Advancement of Psychotherapy, and *Frank Gaynor,* co-author of the "Dictionary of Industrial Psychology," with a preface by *Theodor Reik,* author of "Listening with the Third Ear." 208 pages. Philosophical Library, New York, N. Y., publishers, 1950. Price $3.75.

In this short book the author undertakes to present direct quotations from Freud's writings in his original terms in an effort to thwart misunderstandings and misinterpretations. The work is carefully prepared and annotated, listing the titles of the papers and books from which the excerpts are taken. Because Freud's thinking in psychoanalysis continually developed and changed, in many instances successive quotations are presented to demonstrate the development of his thoughts and hypothesis. A close study of Freud's writings is an essential part of the training of every psychoanalyst no matter what school of analysis he may adhere to. He should, therefore, be familiar with the material quoted in this book, but it may serve as a ready reference volume and as a guide for further study. As such it will also be helpful to the workers in associated fields such as cultural anthropology and the social sciences who are becoming increasingly alert to the value of psychoanalytic theory in their own pursuits. This volume cannot, however, be used as a textbook or means of acquiring a superficial knowledge of the complexities of psychoanalysis.

—*Commander F. H. Ocko, MC, U. S. N.*

Physiology of the Eye, Clinical Application, by *Francis Heed Adler,* M. A., M. D., F. A. C. S., William F. Norris and George E. de Schweinitz Professor of Ophthalmology, School of Medicine, University of Pennsylvania, and Consulting Surgeon, Wills Hospital, Philadelphia. 709 pages; with 319 illustrations, including 2 in color. The C. V. Mosby Co., St. Louis, Mo., publisher, 1950. Price $12.

This text is unlike most texts on physiology in that it deals with the clinical application of known physiologic principles. It, therefore, is of great value to the practicing ophthalmologist, as well as to the student in ophthalmology and the physiologist. At the end of each of the 22 chapters is an extensive bibliography, which one can use for additional information on selected ophthalmologic topics. The illustrations are excellent and complement the excellence of the text. This is a "must book" for all ophthalmologists and especially those preparing for a career in this specialty.—*Rear Admiral C. A. Swanson, MC, U. S. N.*

An Integrated Practice of Medicine, Volume V, pages 4133–4867, by *Harold Thomas Hyman.* 734 pages. W. B. Saunders Co., Philadelphia, Pa., publisher, 1950. Price $10.

This book is masterfully prepared and beautifully written, presenting an up-to-date survey of medical thought, research, and practice. The introduction comprises brief comments on bacterial "fastness," the various types of hyper-

sensitivity and related syndromes with their therapeutic implications. Then follows in alphabetical order a review of subjects from actinomycosis to yellow fever. Much space is devoted to ACTH and related preparations. Graphs and tables augment the presentation throughout the book. The antibacterial spectra of the various antibiotics currently used is presented in a readily accessible form so that one needs only to name the disease to be treated and then read below which of the antibiotics is most efficacious. The various antimalarial agents are similarly presented. A new approach is used in discussing the treatment of specific conditions. It consists of outlining the principles of diagnosis and therapy under each disease heading. Following this, under the subhead "Practical Management," the following items are discussed: (1) prophylaxis, (2) immediate care, (3) continuing care (favorable course), and (4) continuing care (unfavorable course). Neoplasms are covered under such headings as "Cancer Detection," "Specialized Diagnostic Procedures," "Anticarcinogenic Therapeutic Measures," and "Inoperable Malignancy." References are up to date throughout and direct the reader's attention not only to the earlier volumes in this series, but also to the literature in general. The book can be recommended for all practitioners of the art of medicine.

—Commander B. L. Canaga, Jr., MC, U. S. N.

Newer Concepts of Inflammation, by *Valy Menkin*, M. A., M. D., Associate Professor of Experimental Pathology, Head of Experimental Pathology, Agnes Barr Chase Foundation for Cancer Research, Temple University School of Medicine; Formerly, Assistant Professor of Pathology, Duke University School of Medicine; Formerly, Assistant Professor of Pathology, Harvard University Medical School. Presented before the Midwest Seminar of Dental Medicine, Maxwellton Braes, Bailey's Harbor, Wis., September 19–23, 1948. 145 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $3.50.

The author, a world authority on inflammation, has collected this small series of his lectures for physicians and dentists. He reviews the recent studies which have elucidated the basic mechanisms involved in inflammatory reactions, defining inflammation as a manifestation of severe cellular injury in vertebrate animals, or the complex vascular, lymphatic, and local tissue reaction elicited in higher animals by the presence of micro-organisms or of nonviable irritants. Many of the biologic attributes of inflammation result from the liberation by the injured cell of certain substances. The author shows how the *p*H of the exudate affects the cytology of the inflamed area. Inert materials (dyes were used) and bacteria are fixed in situ in these areas. This has led to an important differentiation between bacterial virulence and invasiveness. The role of inflammation in local and general immunity is discussed. The substances produced by injured cells include leukotaxine (the factor which increases capillary permeability), a leukocytosis-promoting factor having a thermolabile and a thermostable component, necrosin, pyrexin, leukopenin and the leukopenic factor, glucose, and possibly a growth promoting factor which hastens tissue repair.

The text is supplemented by many charts, graphs, photomicrographs, and extensive footnotes. Bibliographic references are included at the end of each chapter. Unfortunately little editorial change was made from the lecture style in which these papers were originally written but this does not seriously detract from the value of the work for both pathologists and clinicians.

—Col. W. G. Brandstadt, MC, U. S. A.

Vernal Conjunctivitis, by *M. N. Beigelman,* M. D., Clinical Professor of Surgery (Ophthalmology), University of Southern California School of Medicine; Senior Attending Ophthalmologist, Cedars of Lebanon Hospital; Attending Eye Pathologist, Los Angeles County Hospital; with a foreword by *Sir W. Stewart Duke-Elder,* KCVO., M. A., D. Sc. (St. And.), Ph. D. (Lond.), M. D., Ch. B., F. R. C. S., Hon. D. Sc. (Northwestern). 430 pages. University of Southern California Press, Los Angeles, Calif., publisher, 1950. Price $6.

This easily readable monograph is the latest word on a rare disease, and in it is reviewed all the pertinent literature as far back as 1846. There are 49 figures, 7 of them in color, and 14 tables. The author summarizes 236 case histories. The bibliographic references are grouped according to the years in which they were published.

The name of the disease does not reveal its cause, which is unknown. The idea that allergy may play a part is gaining support and the use of radiant energy has become an established procedure in therapy. The disease occurs most often in males between the age of 6 years and puberty. A racial predilection does not exist. There is a familial tendency but hereditary factors are not proved. There are regional variations in the types of vernal conjunctivitis, but the reasons are not understood. The subjective symptoms are itching, photophobia, burning, lacrimation, and sensation simulating the presence of a foreign body. The author lists various classifications of the disease, the most comprehensive of which is that of Weskamp. The papillary excrescences on the lids, pericorneal thickening, pale blue color, white or Horner Trantas points, pseudogerontoxon, pseudomembrane, stringy secretion, eosinophilia in the tears, and vascular changes revealed by the slit lamp are aids in making the diagnosis. Trachoma, phlyctenular conjunctivitis, infectious granuloma, neoplasms, allergic conjunctivitis, and follicular conjunctivitis, all of which may be associated with vernal conjunctivitis but must be differentiated from it. The association with vasomotor instability, status thymicolymphaticus, endocrine disturbances, changes in blood chemistry, specific supersensitiveness, and nasal and cutaneous lesions are discussed. Histologically the collagenous and reticular fibers are greatly increased and are subject to hyalin degeneration, and numerous eosinophils and plasma cells are found. These changes can undergo a spontaneous complete recovery, usually within 10 years.

Therapy consists of ice packs, eye drops of cocaine and epinephrine, irrigation with slightly acid solution, antihistaminics by mouth, removal to a cooler climate, removal of large proliferations, subconjunctival injections of epinephrine, and radiation therapy.—*Commander L. L. Kenney, MC, U. S. N.*

Clinical Therapeutic Radiology, by *U. V. Portmann,* M. D., editor; Head of Department of Therapeutic Radiology, Cleveland Clinic Foundation; Professor of Therapeutic Radiology, Bunts Educational Institute, Cleveland. 748 pages; illustrated. Thomas Nelson & Sons, New York, N. Y., publisher, 1950. Price $15.

This is a first edition of a compilation of the works of well-selected authors, covering all phases of the clinical application of roentgen and radium therapy in benign and malignant conditions. Subjects are more or less uniformly approached. The classification of tumors of the various glands or systems is generally simplified, from the radiologist's viewpoint, but accepted by the pathologist and clinician. Treatment is outlined according to the given classification with regard to sensitivity and behavior of the lesion. The authors outline specifically their own methods of treatment and give facts and figures of their

results, some comparing the end results with those of other groups or those obtained by other methods of application of radiation therapy. Treatment for metastases and irradiation sequelae is discussed by the individual authors. The chapters on tumors of the testes and treatment of diseases of the skeletal system, joints, and soft tissues are comprehensive and especially well done. Treatment of cancer of the cervix with transvaginal x-rays, interstitial radium, and intracavitary radium is covered by three authors. The use of hormones as an adjunct to therapy is separately discussed, by various writers, giving their criteria, methods, and results. Radioisotopes and radionucleides are briefly but adequately described with a more detailed discussion of the use of radioactive iodine in diseases of the thyroid gland. The volume is made more complete by minimal chapters covering protection, sensitivity of tissue, biologic effects and other closely related subjects, and contact and supervoltage radiation. This book is well printed, clearly illustrated, adequately indexed, with comprehensive chapter bibliographies.—*Commander F. A. Rouff, MC, U. S. N.*

A Textbook of X-ray Diagnosis, by British Authors, in Four Volumes, Vol. III. Edited by *S. Cochrane Shanks*, M. D., F. R. C. P., F. F. R., Director, X-ray Diagnostic Department, University College Hospital, London, and *Peter Kerley*, M. D., F. R. C. P., F. F. R., D. M. R. E., Director, X-ray Department, Westminster Hospital; Radiologist, Royal Chest Hospital, London. 2d edition. 830 pages; 694 illustrations. W. B. Saunders Co., Philadelphia, Pa., publisher, 1950. Price $18.

The revision of this outstanding work is most welcome. It is 12 years since the first edition appeared. The new edition has been made into 4 instead of the original 3 volumes. Its change in format gives to volume 3 the entire realm of the abdomen and its contents. In the earlier edition the urinary and male genital tracts were covered in another volume. The excellence of the illustrations has been maintained. It is regretted that one of the senior editors, Dr. Twining, has died, although he did not contribute to the subject matter of this volume in the earlier edition. The volume is divided into sections on: (1) the alimentary tract, (2) the biliary tract, (3) the abdomen (liver, spleen, and pancreas), (4) radiology in obstetrics, (5) radiology in gynecology, and (6) the urinary tract. The section on the alimentary tract includes radiologic findings in children. The sections on obstetrics and gynecology are entirely new and include different technics used in pelvimetry. The volume succeeds in bringing the subject up to date and most radiologists will want to own it.—*Col. Alexander O. Haff, MC, U. S. A.*

Nervous and Neurohumoral Regulation of Intestinal Motility, by *W. B. Youmans*, M. D., Professor of Physiology, University of Oregon Medical School. 138 pages; 32 illustrations. Interscience Publishers, Inc., New York, N. Y., publisher, 1949. Price $4.50.

This physiologic monograph is expertly written and covers most of the known work on gastrointestinal motility from the standpoint of extrinsic nerve regulation. Primarily this book embodies the author's contributions to this subject from 1935 to 1948, but the pertinent literature is also reviewed. In accordance with true scientific standards, terms are defined, the basic anatomy and physiology are reviewed, and investigational preparations and methods of recording are critically analyzed. The inhibitory effect of epinephrine on the gastrointestinal tract is demonstrated and the effects of sympathetic preganglionic and postganglionic denervations explained. This is important clinically because of the high degree of sensitization of the musculature to epinephrine which occurs following postganglionic section.

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The inhibitory reflexes are discussed individually and their nervous pathways traced experimentally. Among these are anorectal stimulation, the intestinogastric reflex, the peritoneo-intestinal reflex, the intestino-pannicular reflex, distention of the urinary tract and bladder, and stimulation of the motor areas of the cerebral cortex and certain parts of the hypothalamus. The intestinointestinal reflex is fully described and the physiologic antagonism between the inhibitory effect of this reflex and the stimulatory effect of the intrinsic nerve plexuses as brought out by distention of the lumen, is explained. Clinically there are two important points to remember about this latter reflex: (1) when intestinal distention reaches pathologic levels, the inhibition completely counteracts the local excitation; and (2) repeated distentions at a given site sensitizes this area so that inhibition is increased.

The effects of distention of the biliary system are also important to the clinician because: (1) although such distention does not effect intestinal motility, gastric motility is inhibited and tone is increased in the cardia and pylorus (pylorospasm); and (2) although distention of the bile ducts causes nausea and vomiting, distention of the gallbladder produces only nausea.

Stimulatory reflexes to gastrointestinal motility are exemplified by external reflexes via the vagi, such as those caused by stimulation of certain parts of the hypothalamus or frontal cortical areas of the brain. The gastroileal reflex stimulated by feeding, is proved to be an internal stimulating reflex, which is uninfluenced by bilateral vagotomy. The humoral components of nerve stimulation epinephrine and acetylcholine, are each completely evaluated. An explanation is offered, for the unexpected effects which are sometimes obtained, in that a few cholinergic end organs are found in postganglionic sympathetic nerves, and adrenergic end organs are found in the postganglionic vagal nerves.

The only addition to this excellent monograph which could be suggested, is a discussion of the effects on the autonomic nervous system of the various new drugs such as: tetraethyl ammonium chloride, dibenamine, banthine, et cetera.

—Commander L. J. Pope, MC, U. S. N.

Cancer of the Colon and Rectum, Its Diagnosis and Treatment, by *Fred W. Rankin,* B. A., M. A., M. D., LL. D., Sc. D., F. A. C. S., Surgeon, St. Joseph's and Good Samaritan Hospitals, Lexington, Ky.; Clinical Professor of Surgery, University of Louisville, Louisville, Ky., and *A. Stephens Graham,* M. D., M. S. (in Surgery), F. A. C. S., Surgeon, Stuart Circle Hospital, Richmond, Va.; Associate Professor of Surgery, Medical College of Virginia. 2d edition. 427 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $7.50.

When the first edition of this text appeared in 1939 it immediately became an authoritative reference on cancer of the large intestine. The broad experience of the authors presented in a concise yet complete manner accompanied by a liberal review of the current opinions of other recognized authorities in this field resulted in a wide popularity among students and abdominal surgeons. Although in the interval between the first and the second edition important advances have been made in the surgical management of malignant disease of the colon, "surgery for malignancy of the colon and rectum has approached a state of ideal standardization insofar as the pre- and post-operative measures are concerned." Resection and primary anastomosis for right-sided and transverse lesions of the colon are recommended. The value of obstructive resection for lesions of the descending colon is urged as satisfactory and safe, and resection with primary anastomosis in this region is reserved for selected cases. The authors do not support the advocates of sphincter-saving operations for rectal cancer but state

unequivocally that no cancer of the rectum which is below the peritoneal reflection should be submitted to this procedure.

In the section on treatment the discussion of peritoneal vaccination, once popular, has been deleted and emphasis has been placed on parenteral therapy and bowel cleansing and sterilization as preoperative measures. It is emphasized that success in operations on the colon does not necessarily depend on surgical skill but is directly proportionate to the integrity of the local blood supply and the adequacy of decompression and cleansing of the bowel. The advances made in anesthesiology, the place of chemotherapeutic agents and antibiotics, and the growing popularity of the open anastomosis for all bowel resections are recognized.

The bibliography has been brought up to date.

—Col. J. R. Shaeffer, MC, U. S. A.

Clinical Electrocardiography, by *Francis F. Rosenbaum*, M. D., Assistant Clinical Professor of Medicine, Marquette University School of Medicine; Staff, Milwaukee County Hospital; Associate Staff, Columbia Hospital; Adjunct Staff, Milwaukee Children's Hospital; Cardiac Consultant and Attendant, Cardiac Clinic, Milwaukee Children's Hospital, Milwaukee, Wis. Edited by *Henry A. Christian*, A. M., M. D., LL. D., Sc. D. (Hon.), M. A. C. P., Hon. F. R. C. P. (Can.), D. S. M. (A. M. A.), Hersey Professor of the Theory and Practice of Physic, Emeritus, Harvard University; Sometime Clinical Professor of Medicine, Tufts College Medical School; Sometime Visiting Physician, Beth Israel Hospital; Sometime Physician-in-Chief, Carney Hospital; Physician-in-Chief, Emeritus, Peter Bent Brigham Hospital, Boston, Mass. (Reprinted from Oxford Loose-Leaf Medicine with the same page numbers as in that work.) 205 pages; illustrated. Oxford University Press, New York, N. Y., publishers, 1950. Price $4.50.

In recent years increasing numbers of books in the field of cardiovascular disease have appeared so the reader may choose short or long, single topics or wide coverage. In the group of short books on electrocardiography this work stands high. Presumably because of the limited space available for this subject in the Oxford Loose-Leaf Medicine from which it is taken, certain special subjects are mentioned very briefly. Among these are unipolar limb leads, esophageal leads, and vector analysis. The student in these fields, however, will usually consult the original publications. This work covers rather thoroughly the fundamentals of arrhythmias and the patterns of myocardial infarction with adequate illustrations. The great variety of other conditions producing less specific electrocardiographic changes are discussed more briefly and again the inquirer should consult other sources if a more definitive study is being made. A book of this type is particularly valuable to the general practitioner or the internist not specializing in cardiac disease.—*Commander R. C. Parker, Jr., MC, U. S. N.*

Surgery of the Shoulder, by *Anthony F. DePalma*, M. D., James Edwards Professor of Orthopedic Surgery and Head of the Department, Jefferson Medical College, Philadelphia; Attending Orthopedic Surgeon, Jefferson Medical College Hospital, Philadelphia; Attending Orthopedic Surgeon, Methodist Episcopal Hospital, Philadelphia; Attending Orthopedic Surgeon, St. Agnes Hospital, Philadelphia. 438 pages; 454 illustrations. J. B. Lippincott Co., Philadelphia, Pa., publishers, 1950. Price $17.50.

This book is the most comprehensive treatise on the shoulder that has been published in English. It resembles Dr. Bunnell's classic "Surgery of the Hand" in appearance and organization, and discusses in turn the evolution of the shoulder

girdle, the anatomy of the shoulder from the clinical and surgical standpoint, congenital abnormalities, the normal appearance of the components of the glenohumeral joint in each age group (stressing in particular the lesions that are compatible with good function), ruptures of the musculotendinous cuff, frozen shoulder, bicipital tenosynovitis, calcareous tendinitis, dislocations, fractures, shoulder pain of neurogenic origin, birth palsy, tumors, and surgical approaches and procedures.

The outstanding feature of the book is the presentation of the results of DePalma's studies of 452 shoulder joints showing the changes that occur in the glenoid, its labrum, the capsule and musculotendinous cuff, the humeral head, and the biceps tendon in the various age groups. Of these 144 were examined after the death of patients who had been carefully interrogated and examined in their final illness for evidence of symptoms or disability referable to the shoulder and who did not give any evidence of it. These apparently normal shoulders displayed degenerative changes in the cartilage of the glenoid fossa, detachment of the glenoid labrum, partial and complete tears of the musculotendinous cuff, calcareous tendinitis, fraying and rupture of the biceps tendon, and other lesions which were formerly thought to be the cause of shoulder disability and therefore deserving of operative repair. The immediate result of this study should be a more conservative approach to shoulder disability.

Another feature is the author's study of the "frozen" shoulder. He believes that any inflammatory condition about the shoulder or immobilization of the shoulder in a person over 40 may result in a tenosynovitis with adhesions of the biceps tendon in its groove producing limited and painful motion at the scapulohumeral joint. He states that those who do not respond to conservative therapy are relieved of pain and restored to full motion by transplanting the tendon of the long head of the biceps to the coracoid process. Citing no failures, his results are truly remarkable in a condition that until now had been so disappointing to all concerned. The greatest weakness of this book is its repetitiousness. The binding and paper are excellent; the photographs, photomicrographs, reproductions of roentgenograms, and detailed drawings, superb. This book is heartily recommended to all doctors who are called on to diagnose and treat pain and disability in the shoulder.—*Lt. Commander W. S. Stryker, MC, U. S. N.*

Indications for and Results of Splenectomy, by *Frederick A. Coller*, M. D.; *Alexander Blain, III*, M. D., and *Gould Andrews*, M. D., from The Departments of Surgery and Medicine, University of Michigan Medical School, Ann Arbor, Mich. 100 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $2.25.

This excellent monograph represents the results of a detailed analysis of 132 consecutive elective splenectomies for disorders associated with splenic malfunction and enlargement, performed in the period, July 1934 to July 1949. Careful pre- and post-operative studies of all patients in the series were made by the staff of the Simpson Memorial Institute for the Study of Blood Disorders, followed by close follow-up observations in every case. Most of the patients reported were classified as essential thrombocytopenic purpura (40), acquired hemolytic anemia (18), hereditary spherocytic anemia (32), and Banti's syndrome (27). The remaining 15 patients included the rarer types of splenic malfunction and enlargement such as Gaucher's disease, Felty's syndrome, splenic cysts et cetera. The general mortality for the hospital in which this work was done was 7.6 percent, compared with a mortality of 16 percent in patients whose death was directly associated with the splenic disease. Banti's syndrome showed the poorest results, with an ultimate mortality of 29 percent. The results in acquired hemolytic anemia, based on the eventual mortality related to the disease,

were about the same as those obtained in Banti's syndrome, which is in sharp contrast to the excellent results in hereditary spherocytic anemia.

The authors conclude from their analysis that splenectomy offers a specific cure for essential thrombocytopenic purpura, congenital spherocytic anemia, some patients with acquired hemolytic anemia, and a few selected patients with Banti's syndrome, in addition to being of value as a procedure for the relief of mechanical symptoms caused by Gaucher's disease, splenic cysts, and splenic infarction. The authors further believe that mortality rates can be lowered by more vigorous use of transfusions in thrombocytopenic purpura, by avoidance of transfusions in hereditary spherocytic anemia during hemoclastic crises, and by earlier splenectomy in thrombocytopenic purpura (to avoid hemorrhages into the serous cavities and brain), in Banti's syndrome (before onset of hematemesis), and in congenital spherocytic anemia, as well as in acquired hemolytic anemia. Caution is enjoined as to the possibility of accessory spleens, which must be totally removed during splenectomy for splenic malfunction.

Several good diagrammatic illustrations as well as microphotographs of bone marrow and blood smears are offered, which are quite valuable in the interpretation of the lesions and the laboratory findings of the larger groups of patients reported.—*Col. D. R. Sewell, U. S. A. F. (MC)*

When Minds Go Wrong, A Simple Story of The Mentally Ill—Past, Present, and Future, by *John Maurice Grimes*, M. D. Twenty years a psychiatrist. Four years a staff-member of the Council on Medical Education and Hospitals of the American Medical Association. Author of "Institutional Care of Mental Patients in the United States." 237 pages; illustrations by *K. Alexandra White.* Published and distributed by the author, 5209 S. Harper Ave., Chicago 15, Ill., 1950. Price $5.

This is a disputatious attack on the present system of institutional care for mental patients with vehement emphasis on the deficiencies of State hospitals. The source material is largely derived from the author's personal professional experiences in such institutions. Throughout this provocative book Dr. Grimes insists, and properly so, on the essential rights and dignity of the mental patient as a person, deploring the misunderstanding, mistreatment, and degradation that he sees him suffering at the hands of his "guards." The ward attendant, maintained in his tyranny over the patient and doctor alike by the patronage system of political bosses, is the villain of the piece. The author proposes nothing less than the complete elimination of attendants and their replacement by qualified nurses and group leaders. He contends that with attendants eliminated, political control of our State hospitals cannot exist. While to Dr. Grimes this step is the sine qua non of his plan, it is to be taken in conjunction with certain legal reforms, which would make way for the establishment of villages or communities of mental patients, with emphasis on rehabilitation, an approach which he considers social rather than medical.

Although the author's analysis of the problem is oversimplified, his proposed remedies deserve thoughtful consideration. Some have already been tried with varying degrees of success. Some are of debatable value; others will inevitably be impossible of realization, at least until such time as human frailty is more sharply confined to those now called patients.

The book has a table of contents, but no index or bibliography.

—*Lt. Col. W. J. Barker, MC, U. S. A.*

The Clinical Use of Radioactive Isotopes, by *Bertram V. A. Low-Beer,* M. D., Associate Professor of Radiology, University of California Medical School, San Francisco, Calif. Publication Number 54, American Lecture Series. 414 pages; illustrated. Charles C Thomas, Springfield, Ill., publisher, 1950. Price $9.50.

This comprehensive volume comes at a time when it is well to summarize and consolidate the voluminous literature on the subject of isotopes. More than 400 references to scientific literature are quoted covering the period of 1930 to 1949. Physics comprises about one-fourth of the pages and is written in language which should be intelligible to the average physician. Wisely, the author has chosen to emphasize the vast and complicated new information which must be mastered before the isotopes can be understood. Relatively few pages are devoted to the therapeutic phases of the problem. Isotopes have been used in the treatment for many diseases. These are enumerated and an evaluation of the results is recorded. In general, this new source of internal radiation has not been more valuable than the older external sources. The brightest pictures are being painted with radio-phosphorus for polycythemia vera, radio-iodine in disease of the thyroid, and radio-cobalt as a substitute for radium.

Most of the book is devoted to clinical investigation of the isotopes. In the latter sections, the author discusses each isotope under the following headings: (1) mode of production, (2) biochemical properties, (3) uptake in various organs and systems of the body, (4) modes of excretion, (5) metabolism, and (6) radiation effects. The space devoted to each of the above is limited by the incompleteness of our present knowledge. Radio-phosphorus, -iodine, -sodium, and -cobalt are extensively covered and radio-iron, -arsenic, -mercury, -manganese, -gold, and -zinc less so. One is again impressed by the fact which has been frequently expressed, that the investigative use of the isotopes as tracers is much more promising than their use as therapeutic agents.

—Col. E. DeYoung, MC, U. S. A.

Bone and Joint Diseases, Pathology Correlated with Roentgenological and Clinical Features, by *J. Vernon Luck,* M. D. (Ortho.), M. D., F. A. C. S., F. I. C. S., Assistant Clinical Professor of Orthopedic Surgery, University of Southern California. Senior Attending Physician, Department of Orthopedic Surgery, and Consultant in Orthopedic Pathology, Los Angeles County Hospital; Member, Subcommittee in Orthopedic Surgery, National Research Council; Member, Board of Associate Editors, Journal of Bone and Joint Surgery. 614 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $16.50.

This book is a welcome addition to medical literature. It comprises in one volume information that was formerly contained in two or more volumes. The author has accomplished his purpose in attempting to correlate the pathologic anatomy with the associated roentgenologic and clinical findings in diseases of bones and joints. The book is well organized, beginning with a chapter on the normal skeletal system and in each succeeding chapter discussing a separate phase of bone and joint disease. The subject is first presented from a clinical standpoint, followed by a discussion of the anatomic pathology, pathogenesis, and a roentgenologic and clinical correlation. The presentation of diseases of bones and joints is comprehensive. The material has been well chosen so that the reader can acquire a good concept of the subject without reading through numerous details which concern only the investigator. The reader is made aware that the disease under discussion is a dynamic process. This is especially true in the chapter on osteomyelitis and the arthritides. Presented in this manner,

the material is a valuable aid to diagnosis and treatment. There are ample references at the end of each chapter. There are numerous illustrations both in black and white and in color, all of which are very good. This book will be of greatest interest to orthopedists, pathologists, and roentgenologists, but is also recommended to all physicians and surgeons who have occasion to treat bone and joint diseases.—*Commander R. B. Johnson, MC, U. S. N.*

Neurosis and Psychosis, by *Beulah Chamberlain Bosselman,* M. D., Associate Professor of Psychiatry, University of Illinois College of Medicine, Chicago, Ill.; foreword by *Francis J. Gerty,* M. D., Professor of Psychiatry and Head of the Department, University of Illinois College of Medicine, Chicago, Ill. 172 pages. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $4.50.

This attractively bound little volume has been written to provide the medical student with a textbook on general psychiatric orientation. This it does in a readable and yet relatively comprehensive manner. In general the author progresses from the simpler to the more complex conditions. She has achieved excellent continuity by tracing successive degrees of ego dysfunction or disequilibrium, as she calls it, through the various progressive involvements. I was impressed by the unobtrusive yet highly effective manner in which the author has introduced historical data. For the more interested student the footnotes are replete with suggested reading. This book is not only highly recommended for its original purpose but also for instruction of nurses and social service workers, and as a refresher for the general practitioner.

—*Lt. Col. H. E. Wilkinson, MC, U. S. A.*

Diagnosis and Treatment of Tumors of the Head and Neck (Not Including the Central Nervous System), by *Grant E. Ward,* M. D., D. Sc., F. A. C. S., and *James W. Hendrick,* M. D., M. S., From the Departments of Surgery of the School of Medicine University of Maryland, and the Johns Hopkins University School of Medicine, and the Oncology Clinic of the University Hospital and the Tumor Clinic of the Johns Hopkins Hospital. 842 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., publishers, 1950. Price $15.

This is an excellent book from the standpoint of the otolaryngologist and head and neck surgeon. It covers the subject of tumors of the head and neck from the clinical viewpoint better than any other volume I know of. Following a brief introduction there is a well-written, beautifully-illustrated chapter on the early development of the head and neck. The next 4 chapters discuss benign, premalignant, and malignant lesions of the skin of the head and neck, and of the lips. Tumors of the mouth, jaws, salivary glands, tonsils, pharynx, base of the tongue, nose and paranasal sinuses, eye and adnexa, ear, and larynx are described in orderly sequence, using the authors' wide clinical experience as well as the experience of their well-known colleagues in Baltimore as the basis for discussion. The chapters dealing with tumors of the neck, are especially well done. Treatment of the various benign and malignant lesions is well covered throughout. Irradiation, surgery, mustard gas therapy, and electrosurgery are extensively considered. Surgical technic is described in detail in many instances. The text is profusely illustrated with drawings, black and white photographs, and many color plates. This book should be available to all surgical and otolaryngologic residents, and would be a welcome addition to the library of any oncologist.

—*Capt. A. J. Delaney, MC, U. S. N.*

Regional Orthopedic Surgery, by *Paul C. Colonna,* M. D., Professor of Orthopedic Surgery, University of Pennsylvania Medical School. 706 pages; 474 illustrations. W. B. Saunders Co., Philadelphia, Pa., publisher, 1950. Price $11.50.

In his preface, the author states, "It is a particularly hazardous undertaking today for any one individual to attempt to write on a subject that has as many facets as present-day orthopedic surgery." Nevertheless, he has attempted this hazardous undertaking and has written a book that will be especially welcomed by the medical student, intern, and resident as it combines, under one cover, and in a manner not previously accomplished by others, two facets of orthopedic surgery, namely, bone disease and injuries. The student will also appreciate the manner in which the subject matter is organized into specific regions of the body, each one introduced with a few pages of description of the applied anatomy of the part. To include as much material as has been placed in this book, the author has had to condense much of it to the point where it becomes reference material only. This criticism applies less to the chapters on the hip and pelvic ring and on the foot and ankle than to the rest of the book. The introductory chapters on physiology, orthopedic examination, and general pathology are concise and up to date. One cannot help wish that the book could have been lengthened to include amputations and to have gone into greater detail on the treatment of compound fractures, bone grafting, intramedullary fixation, and the orthopedic contributions of World War II. This could have been accomplished without lengthening the text by omitting the chapter on physical therapy, a medical specialty in itself, which seems to have been tacked on at the end of the book as an afterthought. The book is well illustrated with photographs and line drawings.

—*Lt. Col. R. C. Rounds, U. S. A. F. (MC).*

Advances in Internal Medicine, Vol. IV, edited by *William Dock,* M. D., Long Island College of Medicine, Brooklyn, N. Y., and *I. Snapper,* M. D., The Mount Sinai Hospital, New York, N. Y.; with four Associate Editors. 549 pages, illustrated. The Year Book Publishers, Inc., Chicago, Ill., publishers, 1950. Price $10.

This is a compilation of monographs on subjects of current interest in the field of internal medicine. The associate editors are Tinsley R. Harrison, Chester S. Keefer, Warfield T. Longcope, and J. Murray Steele. Each article has a complete table of contents and includes an impressive list of references. It would be difficult to find more thorough discussions of the subject matter in such condensed, well organized, and readable form. Each of the monographs is introduced by a brief historical survey and a review of the fundamental basic science necessary for intelligent comprehension of the subject as applied clinically. This volume is recommended for the internist and should be of value to medical officers preparing for their specialty board examinations.

Karnofsky reviews the current information on nitrogen mustards in the treatment of neoplastic disease. The use of radioactive isotopes for clinical and investigational purposes is discussed by Wasserman and Loevinger. Doctors Braude and Spink correlate information on the diagnosis and treatment of brucellosis. Rabinovitch and McEachern deserve special recognition for their refreshing discussion of a tedious and confusing subject, neuromuscular disorders. Another exceptional presentation is William Dock's monograph clarifying the confusion regarding the use of sodium depletion in therapy. The use of anticoagulants is described by Estes and Allen. Patek summarizes our present knowledge of hepatitis and cirrhosis of the liver, and the hepatic tests are reviewed, explained, and discussed by Popper and Schaffner. The vascular physiology of hypertension is reviewed by Pickering.

—*Maj. J. C. Shrader, U. S. A. F. (MC)*

The Clinical Use of Testosterone, by *Henry H. Turner,* M. D., F. A. C. P., Clinical Professor of Medicine, School of Medicine, University of Oklahoma, Oklahoma City, Okla. 69 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $2.25.

This monograph is well written and presents the data with respect to testosterone in a concise and lucid manner. The discussion is amply documented and presents the data pro and con with respect to the employment of testosterone. This book is recommended to all who employ testosterone in their practice.

—Col. R. A. Radke, MC, U. S. A.

Plasma Clot Suture of Peripheral Nerves and Nerve Roots—Rationale and Technique, by *I. M. Tarlov,* M. D., Associate Professor of Neurosurgery, New York Medical College, New York City. 116 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $5.50.

This book is a description of an admirable technic probably not destined to be used as much as the author might wish, but one which in certain instances gives incomparable results. The technics described are the result of painstaking research. Excellent descriptions and many fine microphotographs of each step in the procedure are presented but should be supplemented by some training and experience in the use of the plasma clot suture kit because many neurosurgeons are probably unfamiliar with the use of certain of the materials employed. The possibilities of the use of this procedure are described. It would seem to be of especial value in cable graft sutures, in certain anastamoses of small nerves (e. g., spinal accessory-facial, hypoglossal-facial), and in the repair of anterior roots in the cauda equina, but the military neurosurgeon in the field is not likely to accept or risk using this technic which stretches peripheral nerves to achieve approximation of the severed ends. Nevertheless, the method is of great interest to the neurosurgeons in centers where patients requiring peripheral nerve repair are now abundant, as a result of the Korean conflict.

—Lt. Comdr. G. Clark, MC, U. S. N.

Surgery of Cataract, by *Daniel B. Kirby,* A. M., M. D., LL. D., Professor of Ophthalmology (former Chairman of the Department), College of Medicine, New York University; Attending Surgeon (former Director), Department of Ophthalmology, Bellevue Hospital; Surgeon, New York Eye and Ear Infirmary; Consulting Ophthalmic Surgeon, Manhattan Eye, Ear and Throat Hospital, St. Clare's Hospital, Department of Ophthalmology, and New Rochelle Hospital, Department of Ophthalmology; former Associate in Ophthalmology, College of Physicians and Surgeons, Columbia University; former Attending Surgeon, Institute of Ophthalmology, Presbyterian Hospital in the City of New York; and Fellow, The American College of Surgeons and The Pan-American Association of Ophthalmology. 695 pages; 339 illustrations including 52 subjects on 21 color plates. J. B. Lippincott Co., Philadelphia, Pa., publisher, 1950. Price $30.

This book is written by a renowned authority on ophthalmic operations, particularly those for cataract. It is the most comprehensive monograph on operations for cataract that I know of. Dr. Kirby discusses in detail the history and development of these operations. The cause and all phases of development of cataracts are discussed and the differential diagnoses of the various types of cataracts are exceptionally well illustrated in color. In discussing the surgical treatment of cataracts the author not only gives his own method, but also those of many of his contemporaries. I believe the outstanding things in this book are his discussion of preoperative and postoperative care and the description of

his technic in performing the intracapsular cataract operation. His advice on instruments and technics is excellent. This volume is highly recommended to all residents in ophthalmology and all practicing ophthalmologists.

—*Col. A. Lowrey, MC, U. S. A.*

Oral Pathology, A Histological, Roentgenological, and Clinical Study of the Diseases of the Teeth, Jaws, and Mouth, by *Kurt H. Thoma,* D. M. D., F. D. S., R. C. S., (Eng.), F. D. S., R. C. S., h. c. (Edin.), Professor of Oral Surgery, Emeritus, and Brackett Professor of Oral Pathology, Harvard University; Honorary Professor of the Odontologic Faculty, San Carlos University, Guatemala; Lecturer in Oral Surgery, Graduate School of Medicine, University of Pennsylvania; Member of Board of Consultation, Formerly Oral Surgeon and Chief of Dental Service, Massachusetts General Hospital; Oral Surgeon to Brooks Hospital; Consulting Oral Surgeon, New England Baptist Hospital, Beth Israel Hospital, Tumor Department of Boston Dispensary, New England Center Hospital, Faulkner Hospital; Consultant in Oral Surgery, Army Medical Center, and Consultant in Oral Pathology, Armed Forces Institute of Pathology, Washington, D. C. 3d edition. 1,592 pages; with 1,660 illustrations, including 78 in color. The C. V. Mosby Company, St. Louis, Mo., publisher, 1950. Price $17.50.

This new edition of a splendid text on oral pathology by a well-known, competent, and prolific author contains 260 more pages than the second edition, which appeared 6 years earlier. In this revision much of the material has been rearranged, and there have been deletions and additions in many of the chapters. The section on periodontia has been completely rewritten. Odontogenic cysts have been reclassified and rightfully separated from neoplasms. The naming of odontogenic tumors and classification differs from that in the second edition. The chapter on dental caries has been brought up to date.

This book is divided into nine parts: (1) experimental pathology, (2) anomalies and dental diseases of the teeth, (3) odontitis, (4) anomalies and diseases of the head and jaws, (5) abnormalities of the temporomandibular joint, (6) diseases of the nerves and muscles, (7) oral diseases, (8) diseases of the salivary glands, and (9) neoplasms. Each part consists of several chapters, and at the end of each chapter there is an extensive bibliography. Nearly every disease or condition discussed, no matter how rare, is well illustrated. The book is written in a conversational manner, and is easy to read. Each entity is considered as to pathogenesis, clinical findings, roentgenographic findings, histopathology, and treatment. The histopathology of some lesions is not thoroughly covered and is not always accurately described, but as this is a book of practical clinical pathology, a few discrepancies as to the histopathology do not detract from its great value. Probably every pathologic condition which a dentist might possibly encounter is discussed in this volume.

It is truly remarkable that one man could compile a text of such wide scope in one lifetime, let alone keep it up to date. It is highly recommended for dentists and physicians who deal with oral diseases.

—*Commander R. A. Colby, DC, U. S. N.*

Evaluation in Physical Education, Better Teaching Through Testing, by *M. Gladys Scott,* Professor of Physical Education, State University of Iowa, and *Esther French,* Professor and Head, Department of Health and Physical Education for Women, Illinois State Normal University. 348 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., publisher, 1950. Price $4.

This well-organized and carefully written book presents a nontechnical discussion of testing in physical education programs for girls and women. The particular point stressed is that testing must be considered and used in relation to aims and objectives and that its value depends on the benefit derived by the individual student. The various sections devoted to test construction, selection, and use are clear, concise, and well developed. This is especially true of those portions which deal with statistical procedures and the interpretation of test scores. Numerous well-chosen tests illustrative of the technics involved are included in the text. The authors have rendered a definite service to women in physical education by bringing together in one of the few volumes of its kind the pertinent facts relative to the evaluation process. This book should prove an ideal text for students and for those physical educators who have had no previous training in testing procedures.—*Lt. Col. J. B. Parsons, U. S. A. F.* (*MSC*)

Carbon Dioxide Therapy, A Neurophysiological Treatment of Nervous Disorders, by *L. J. Meduna,* M.D., Professor of Psychiatry, University of Illinois College of Medicine, Chicago, Ill. 236 pages. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $5.

This book is a concise, well-written account of a new type of therapy for psychiatric conditions, particularly those of a neurotic nature. This new therapy involves the use of carbon dioxide gas through inhalation and requires no accompanying psychotherapy. The various chapters of the book deal with the actions of carbon dioxide on brain function, the technic of administration, case histories, and a description of a neurophysiologic theory of psychoneuroses. At times it seems that the author is somewhat rigid and dogmatic in the expression of his opposition to many of the commonly accepted psychoanalytic theories; however, many convincing neurophysiologic data and experiments are presented to support his theory that neuroses are essentially caused by altered function of brain cells and can be changed by physical or chemical rather than psychologic technics.

Carbon dioxide acts as a powerful narcotic when inhaled in sufficient quantity. Animals exposed to the gas have become completely anesthetized. In addition, it is said to act as an antagonist to convulsions produced by electrical stimulation of the cerebral cortex. Carbon dioxide increases the ability of an isolated nerve to perform work. In its effect on the brain CO_2 produces changes in the motor, sensory, emotional, perceptual, and vegetative function and the state of consciousness. Insofar as the motor functions are concerned, the inhalation of CO_2 produces, in succession: fluttering of the eyelids, psychomotor excitement, flexion of the lower extremities, at times coital movements, conjugate deviation of the eyes, rhythmic movements of the legs, plastic tonus, and finally, after 60 to 90 inhalations, opisthotonus, tonic seizures, and areflexia. Frequently there is a tonicoclonic convulsion. After these seizures the patient at once regains consciousness. As far as sensory changes are concerned the patient frequently dreams during the treatment and often experiences a "feeling of nothingness" or of being "projected into space."

The technic and administration of the treatment involves the inhalation of a mixture of 30 percent CO_2 and 70 percent oxygen. Very little explanation of the treatment is given the patient, although he is assured that he will receive plenty of oxygen and is told not to be alarmed if he experiences a choking sensation. The treatments are usually given 3 times a week until from 20 to 150 treatments have been given using 25 or more respirations per treatment. The author believes that this therapy is best suited for the psychoneuroses and psychosomatic

disorders other than obsessive-compulsive neurosis. It is of little therapeutic value in psychoses.

In the last chapter the author presents "a neurophysiological therapy of psychoneuroses," in summary of which he offers the following opinions: (1) behavior is a homeostatic action of the nervous system; (2) the homeostasis is achieved by mobilizing reverberating circuits of different types; (3) homeostasis will be successful if the output of the system is equal to the input; (4) if the output of any reverberating system reinforces the input, mounting inner tension ensues and psychoneurosis results; and (5) any decrease in the threshold of stimulation prevents successful homeostasis and produces psychoneurosis. The author believes that CO_2 introduced into a living person in an appropriate way can cure a certain percent of psychoneuroses regardless of the symptoms, duration, mechanisms, dynamics, and symbolic references.

This book presents a little known form of treatment for the psychoneuroses in a highly scientific manner. It represents the result of a tremendous amount of well-planned experimentation and clinical observation based on sound neurophysiologic principles. It should serve as an inducement for others to carry out this type of treatment on larger groups of patients in an endeavor to test its efficacy.—*Commander W. R. Griswold, MC, U. S. N.*

The Physician Examines the Bible, by *C. Raimer Smith,* B. S., M. D., D. N. B. 394 pages. Philosophical Library, New York, N. Y., publisher, 1950. Price $4.25.

The author undertakes an examination of the Scriptures from the standpoint of a physician and a man of science. The substance of the book consists of two principal parts: a catalog of items of medical interest found in the Bible, and an appraisal of the Bible's basic teachings in the light of modern science. In the first the author's interest as a physician has led him to compile from the Old and New Testaments and the Apocrypha an extensive and detailed list of references pertaining to health, sickness, drugs, healing, and health practices. This material is collated by subject and presented with comments based on current medical knowledge. Then, as a man who believes in both science and religion, the author explains the basis on which he reconciles apparent conflicts between religious and scientific truth, stating his understanding of such fundamental concepts as the relationship of God to the universe. The book is addressed to young people, and the presentation is made on a nonprofessional level. A large part of the book is tiresome reading for a physician, being devoted to elementary facts of medicine and the sciences. For the intended audience, however, this feature should not be objectionable. The extensive references to medical subjects will appeal to physicians who are students of the Bible and will be helpful to anyone interested in Biblical medicine.

—*Capt. R. L. Ware, MC, U. S. N.*

Methods in Medical Research, Volume 3. Governing Board: *Irvine H. Page,* Chairman; *A. C. Ivy, Colin M. MacLeod, Carl F. Schmidt, Eugene A. Stead, David L. Thomson. Ralph W. Gerard,* Editor in Chief; *S. E. Luria,* Editor, Genetics of Micro-organisms; *J. H. Gaddum,* Editor, Assay of Neurohumors; *Walter R. Miles,* Editor, Selected Psychomotor Measurement Methods; *Choh Hao Li,* Editor, Methods for Study of Peptide Structure. 312 pages. The Year Book Publishers, Inc., Chicago, Ill., publishers, 1950. Price $7.

Ideas, those products of the abstract, tend to remain only ideas until some factual proof is advanced for their support. In the medical sciences, as in other sciences, such proof depends on the accumulation of pertinent data from care-

fully designated experiments, and experiments require methods of testing or measuring. As the governing board of the series of publications entitled "Methods in Medical Research" so aptly point out in the preface to this volume, critical reviews of the results of investigations are readily available whereas a similar treatise on the methods of experimentation is often difficult to find. They are justified in their opinion that a carefully selected collection of methods related to medical research would be timely.

The contents of this volume are divided into four general sections: the first, edited by S. E. Luria, deals with methods of studying the genetics of microorganisms; the second, edited by J. H. Gaddum, presents methods of assay of neurohumors; the third, edited by Walter R. Miles, offers methods of psychomotor measurement; and the fourth, edited by Choh Hao Li, describes some methods for the study of peptide structure. Each section is a compilation of subsections written by well-known authorities. The methods included represent a studied selection by the individual experts as those most generally applicable. No claim is made to list all available methods, although a fairly comprehensive bibliography is included for the benefit of those who desire additional details. It is gratifying to find a discussion of methods in which many practical details are not curtailed by the editorial staff, a practice so frequently encountered in the current journals. For example, in the section on the microbiologic assay of amino acids by J. C. Lewis, there is a heading entitled simply "Troubles" under which some of the common difficulties encountered in the procedures are described and suggestions made for their solution.

This volume would be a valuable addition to the reference shelves of any institution engaged in medical research.—*Maj. C. L. Wisseman, Jr., MC, U. S. A.*

The 1950 Year Book of Obstetrics and Gynecology (August 1949–July 1950), edited by *J. P. Greenhill*, B. S., M. D., F. A. C. S., Professor of Gynecology, Cook County Graduate School of Medicine; Attending Obstetrician and Gynecologist, Michael Reese Hospital; Associate Staff, Chicago Lying-In Hospital; Author of Office Gynecology and Obstetrics In General Practice; Co-author of the DeLee-Greenhill Principles and Practice of Obstetrics. 570 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., publishers, 1950. Price $5.

This volume is one of the important publications to which the physician interested in the many facets of obstetrics and gynecology looks forward each year. There is something in it of value for everyone interested in this field and the reviews are accurate and succinct. The editor's observations may not always seem unbiased, but he can never be accused of not stating his own point of view with honest convictions. With the rapid strides being made in our knowledge, the average busy practitioner is forced to depend on works of this kind. This book indexes all the important contributions to the literature of this specialty and offers ready reference to the original sources. Of particular interest is the report of the self-appointed committee which has attempted to simplify and standardize the classifications of the so-called toxemias. The article from which the Aldridge technic of total hysterectomy was condensed should be carefully studied by anyone performing such operations even though the subject matter has been skillfully abstracted in this volume.

—*Commander R. E. Crowder, MC, U. S. N.*

Types of Diabetes Mellitus and Their Treatment, by *Arthur R. Colwell*, M. D., Associate Professor of Medicine and Director of Medical Specialty Training, Northwestern University Medical School; Attending Physician, Evanston Hospital; Consulting Physician, Wesley Memorial Hospital,

Municipal Tuberculosis Sanitarium, Chicago, Ill. Publication Number 67, American Lecture Series. 97 pages. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $2.25.

The material in this book is condensed for quick perusal by the general clinical reader. The ideas presented are fundamentally sound. The last portion of the book is devoted to the treatment of diabetes with complications.

—*Col. E. A. Cleve, MC, U. S. A.*

Plastic and Reconstructive Surgery, A Manual of Management, by *Ferris Smith*, M. D., F. A. C. S., Consultant in Plastic Surgery, Blodgett Memorial Hospital, Grand Rapids, Mich. 895 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1950. Price $15.

The experience of the author of this book reaches back to World War I, when, as a major in the British Army, he aided in developing the field of plastic and reconstructive surgery. This volume appears to be an enlargement of the text on plastic and maxillofacial surgery written for the use of the Armed Forces at the beginning of World War II. Added special points stress methods and uses of surgical procedures which have been overlooked or ignored perhaps because of the overemphasis and popularization of the tube pedicle and free skin graft. The book stresses the author's experience and belief in Morristan's methods of stage excision for facial lesions. It includes a discussion of (1) the value and method of determining Langer's lines, (2) the treatment of elephantiasis by massive excision of skin and subcutaneous tissue replaced by free skin grafts, and (3) maxillofacial orthopedics. The author calls attention to the necessity for cooperation between specialists because plastic surgery overlaps so many other fields.—*Col. B. N. Soderberg, MC, U. S. A.*

Manson's Tropical Diseases, A Manual of The Diseases of Warm Climates, edited by *Sir Philip H. Manson-Bahr*, C. M. G., D. S. O., M. A., M. D., D. T. M. and H. Cantab., F. R. C. P. Lond., Past President of the Royal Society of Tropical Medicine and Hygiene, London, and the Medical Society of London. Consulting Physician to the Hospital for Tropical Diseases, London; the Albert Dock Hospital and Tilbury Hospital. Consultant in Tropical Diseases to the Admiralty. Formerly Consulting Physician to the Colonial Office and Crown Agents for the Colonies. Formerly Consultant in Tropical Diseases to the Royal Air Force and Ministry of Pensions. Late Director, Division of Tropical Medicine, London School of Hygiene and Tropical Medicine; and Lecturer on Tropical Medicine to the London Hospital; Corresponding Member of the Societe de Pathologie Exotique and of the Soc. Belge de Med. Trop. Member of the Washington Academy of Medicine; Examiner in Tropical Medicine to the Conjoint Board of the Royal College of Physicians and Royal College of Surgeons, England, Late Examiner to Cambridge and Hongkong Universities. Author (with A. Alcock) of "The Life and Work of Sir Patrick Manson," 1927; "The Dysenteric Disorders," 1939, and "Synopsis of Tropical Medicine," 1943. 13th edition. 1,136 pages, with 17 colour plates, 9 half-tone plates, 412 figures in the text, 8 maps, and 29 charts. The Williams & Wilkins Co., Baltimore, Md., publisher, 1950. Price $9.

The fiftieth anniversary edition of this justly famous book is compact and encyclopedic. It is up-to-date, including references to the literature published in 1949. It is handy in size despite its 1,136 pages, is printed on high-grade paper, and contains many useful illustrations. Its complete coverage of the laboratory, as well as clinical aspects of tropical medicine; the conciseness of

its style; and its separate alphabetical table of drugs useful in tropical medicine, listing synonyms, uses and dosage, are worthy of special note. It is unfortunate that, although references are extensively cited by author and year, the periodicals in which they were published are not named. The cause of famine edema is probably more complex than a simple reduction in plasma proteins as stated on page 456. The liver necroses of African natives caused by a low-protein diet is not stressed. Although the importance and frequency of cardiac complications in scrub typhus, and the interesting electrocardiographic changes (inverted T waves) often noted following the intravenous administration of tartar emetic are not mentioned, this is the kind of book that one would select if given the choice of taking only one volume to the tropics. In this day of high prices it is a pleasure to recommend a book that is modestly priced for its size and quality.

—Col. R. P. Johnson, MC, U. S. A.

Food Allergy, by *Herbert J. Rinkel*, M. D., F. A. C. P., F. A. C. A., F. A. A. A., formerly, Associate Instructor in Medicine, University of Oklahoma, School of Medicine; *Theron G. Randolph*, M. D., F. A. C. A., F. A. A. A., A. A. C. P., Instructor in Medicine, Northwestern University Medical School; and *Michael Zeller*, M. D., F. A. C. P., F. A. C. A., F. A. A. A., Clinical Instructor in Medicine, University of Illinois College of Medicine. 492 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $8.50.

This new volume describes the method used by the authors for treating patients who are allergic to foods. It consists in performing deliberate ingestive food tests to determine allergens, prescribing a diet based on these tested foods and then adding more foods according to the "escalator" system. The authors have performed over 50,000 food tests and describe their observations in various allergic conditions. This extensive experience has led them to formulate a theory of food allergy which Dr. Rinkel has previously described in numerous articles and talks. His eloquence is most impressive but in practice, application of his principles by other allergists sometimes fails to give the results which would be expected from his publications, including this book. In addition to a thorough discussion of their theory of food allergy, the authors devoted 2 chapters to explaining the various symptoms caused by food allergens. This section is followed by 5 detailed and interesting chapters on the specific diagnosis of food allergy. The large amount of clinical observations on which their method is based is clearly evident in this portion of the book. Their conclusion as to the lack of value of skin tests with foods is worth noting by all physicians.

Subsequent chapters cover (1) the treatment of food allergy, (2) specific food allergens, (3) recipes for use with therapeutic diets, (4) the Food, Drug and Cosmetic Act, and (5) selected case records. This book is an improvement on the previously published texts on food allergy. With widespread trial of the methods suggested, further progress can be expected in this controversial field. Because food allergy is a problem which every physician, regardless of his specialty or type of practice, may encounter, this book deserves careful reading.*—Col. W. H. Diessner, MC, U. S. A.*

Diagnostic Procedures and Reagents, edited by *Ralph S. Muckenfuss*, M. D., Assistant Commissioner, New York City Health Department. Report prepared by the Subcommittee on Diagnostic Procedures and Reagents of the American Public Health Association. 3d edition. 589 pages; illustrated. American Public Health Association, Inc., 1790 Broadway, New York 19, N. Y., publishers, 1950. Price $6.

This book is a reliable laboratory reference. In keeping with its editorial policy, the technical procedures presented are those considered most generally useful by the specific author involved. The wise selection of authors for each subject and the able editing by Dr. Ralph S. Muckenfuss, Chairman, Subcommittee on Diagnostic Procedures and Reagents, American Public Health Association, has resulted in a concise laboratory manual that will be found to be extremely useful to all technical workers engaged in diagnostic work in the field of communicable diseases exclusive of the virus and rickettsial agents. Although it is ably presented, one wonders why the technic for Rh testing is also included in this manual.—*Col W. S. Stone, MC, U. S. A.*

Pharmacological Basis of Penicillin Therapy, by *Karl H. Beyer,* Ph. D., M. D., F. A. C. P., Director of Pharmacological Research, The Medical Research Division, Sharp and Dohme, Incorporated, Glenolden, Pa. Publication No. 77, American Lecture Series. 214 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1950. Price $4.50.

This monograph presents the pharmacology of penicillin including the author's own ideas and a comprehensive review of the literature with excellent bibliographies at the end of each chapter. The importance of the subject to the medical profession is stressed by a statement that in 1948 the combined sales of penicillin and streptomycin was 60 percent of the total dollar sales of all medicinal products. Penicillin alone accounted for a little less than half the total dollar sales of all drugs. At least 5 penicillins are known, all of which are substitutions of the B-lactam structure. Penicillin-G, the benzyl ester, is the most stable and has the highest antibacterial activity in vivo. Penicillin is rapidly eliminated by the kidneys when given intravenously but is poorly absorbed after oral administration. In most persons an oral dose 5 to 10 times the intramuscular dose is required to obtain the same serum levels. The loss by oral administration is accounted for by a combination of poor absorption and destruction of penicillin by penicillinase elaborated by the intestinal bacteria. Acid activity of the stomach has a minor role in the relative ineffectiveness of penicillin given by mouth. Penicillin is toxic to human beings through sensitivity of the allergic type and a lowering of clotting time but in guinea pigs massive doses have caused total necrosis of the adrenal glands.

After the parental administration of penicillin, it is rapidly distributed throughout the extracellular fluid and concentrated in some organs, particularly the liver and kidneys. Diffusion of penicillin through boundaries of body cavities or fluid containing spaces is limited but increased by inflammation. Penicillin is both bacteriostatic and bactericidal. Both these effects are caused by the ability of penicillin to inhibit the assimilation of glutamic acid by organisms that do not make but require preformed glutamic acid for growth (gram-positive organisms). The concentration of penicillin determines whether this effect will merely inhibit growth or actually kill the organisms present. This fact is important to the clinician in deciding on the relation of depot penicillin dosage and large doses of the water soluble solutions. The problem of maintaining maximum concentrations of penicillin has been attacked more or less successfully by adjuvant drugs (caronamide and benemid) which compete successfully with the penicillin in kidney excretion. In addition, benemid appears to be less toxic and more truly an adjuvant drug than caronamide.

—*Col. W. D. Preston, U. S. A. F. (MC)*

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